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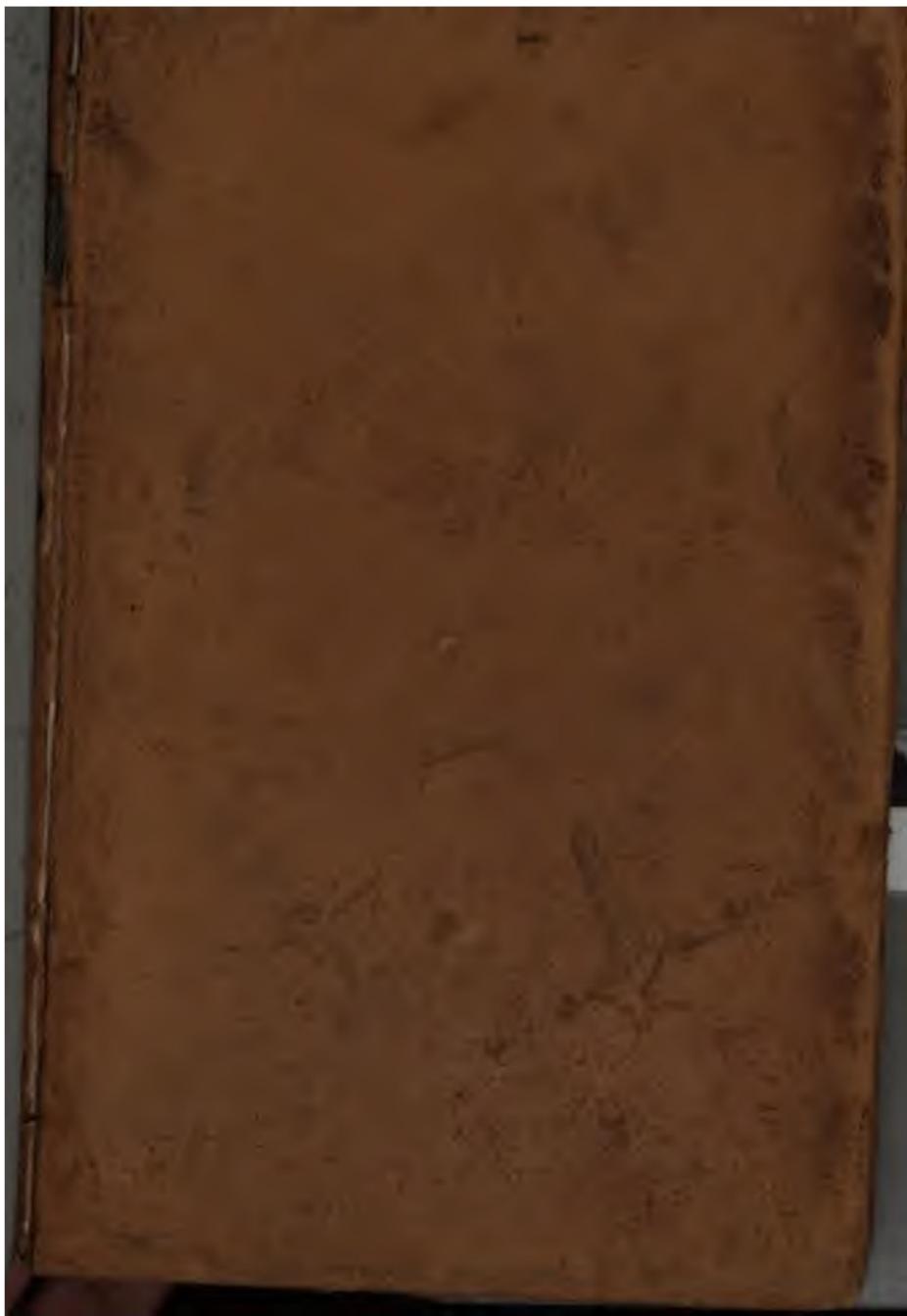
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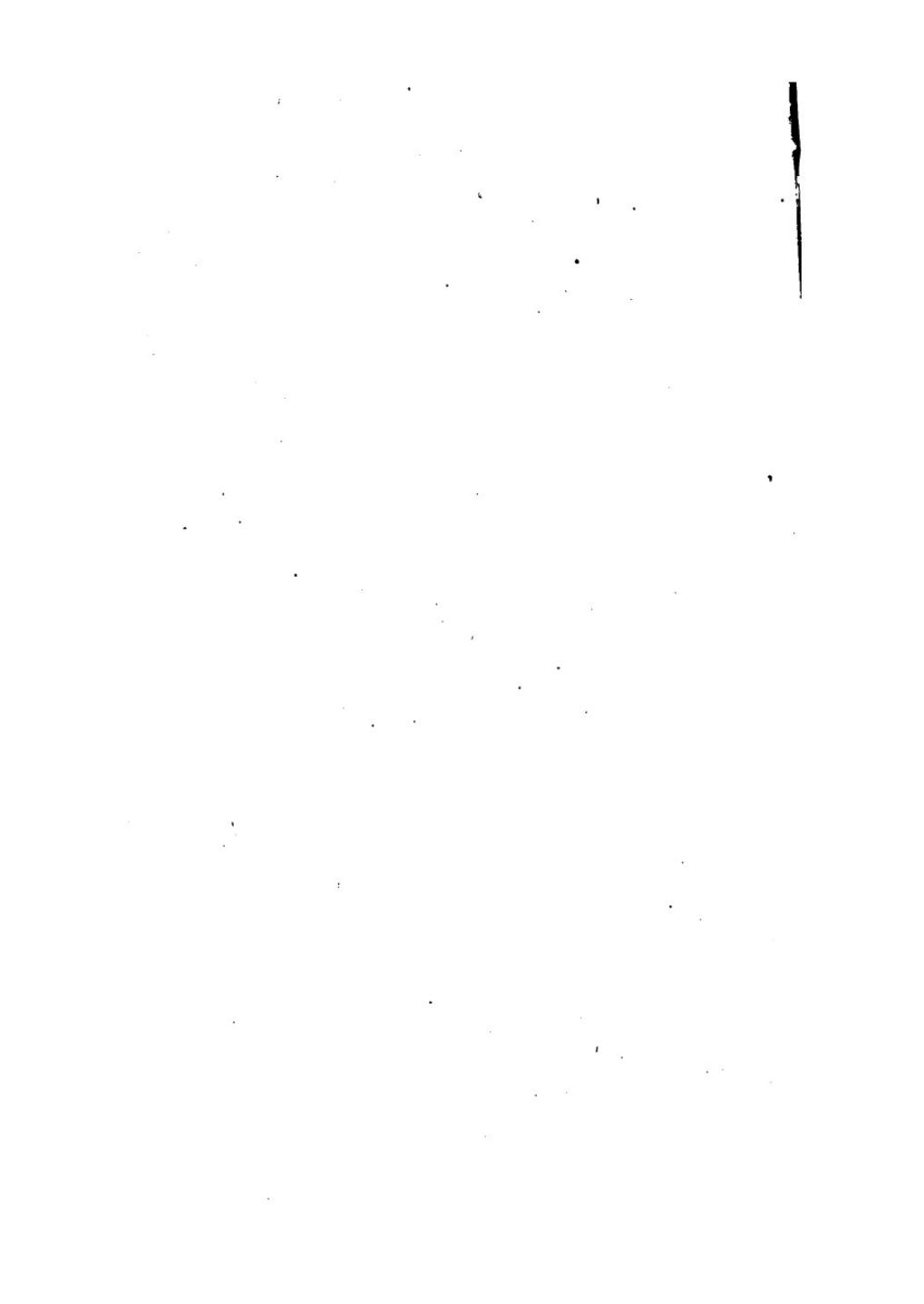


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0.796

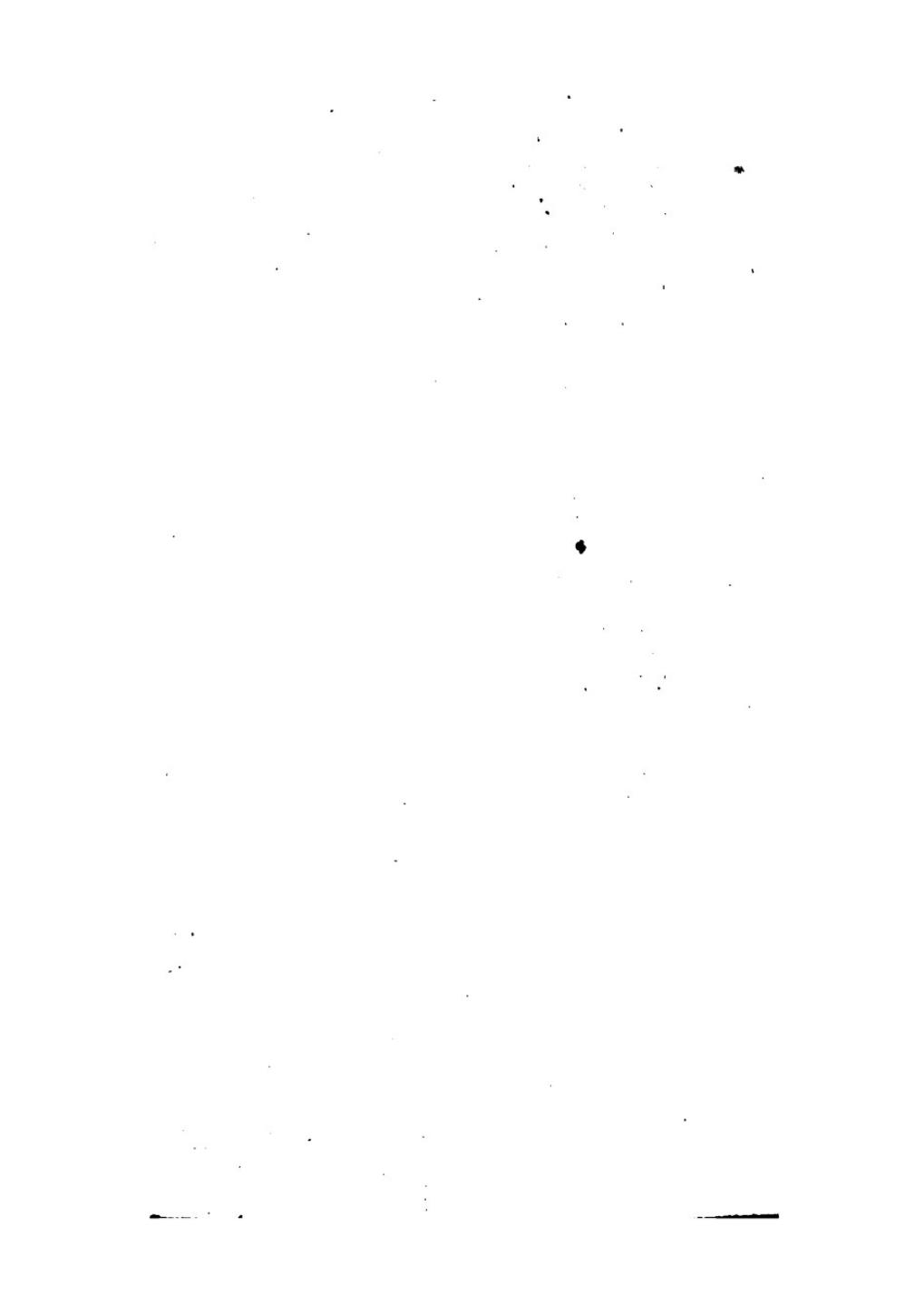




3 2044 096 995 394







A
© COMPLETE KEY
TO
SMILEY'S
NEW FEDERAL CALCULATOR,
OR
Scholar's Assistant;

IN WHICH THE

METHOD OF SOLVING ALL THE QUESTIONS CONTAINED
IN THAT WORK IS EXHIBITED AT LARGE.

DESIGNED

TO FACILITATE THE LABOUR OF TEACHERS, AND ASSIST
THOSE WHO HAVE NOT THE ADVANTAGE OF A
TUTOR'S AID.

BY THOMAS T. SMILEY,

Author of an Easy Introduction to the Study of Geography. Also,
of Sacred Geography, for the use of Schools.

PHILADELPHIA:
LIPPINCOTT, GRAMBO, & CO.
SUCCESSORS TO
GRIGG, ELLIOT & CO.,
No. 14, NORTH FOURTH ST.
1850.

~~Eduett~~, 118.46.13-

Eduett 118.50.796

✓
1869, June 14.
Gift of
Royal Whitman Kerrill,
of Cambridge.
(No. 6. 1869.)

Entered, according to the Act of Congress, in the year 1846, by
JOHN GRIGG,
in the clerk's office of the District Court of the Eastern District
of Pennsylvania.

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EXPLANATION OF CHARACTERS.

Signs.

=

Significations.

Equal; as $20s.=£1$.

+

Addition, (or more) as $6+2=8$.

-

Subtraction, (or less) as $8-2=6$.

×

Multiplication, (or multiplied by) as $6\times 2=12$.

÷

Division, (or divided by) as $6\div 2=3$.

:::

Proportionally; as $2:4::6:12$.

✓ or $\sqrt{}$

Square Root; as $\sqrt[2]{64}=8$.

$\sqrt[3]{}$

Cube Root; as $\sqrt[3]{64}=4$.

—

A vinculum; denoting the several quantities over which it is drawn, to be considered jointly as a simple quantity.

A KEY

TO

The New Federal Calculator.

SIMPLE ADDITION.

EXAMPLES.

(8)	4829	(9)	91769	(10)	876994
	1234		14678		213678
	6101		80032		482906
	3014		71897		809769
	5618		76989		376980
	<u>20796</u>		<u>335365</u>		<u>2760327</u>
(11)	389261	(12)	2136784	(13)	3769894
	789794		8297698		4976082
	849798		8297694		4569761
	487697		4897695		8213243
	999996		1234697		4876962
	948219		7092032		4876920
	<u>4464765</u>		<u>31956600</u>		<u>31282662</u>
(14)	37856	(15)	378269	(16)	141
	975		402607		5672
	1234		702		82971
	14		1246		34676
	5612		2132		1459
	2075		45178		427
	16287		10276		12
	<u>64053</u>		<u>840410</u>		<u>125358</u>

SIMPLE ADDITION.

(17)	14	(18)	36	(19)	3797	(20)	205
	16		97		95		20
	23		125		2		840
	29		384		75		970
	80		1176		876		367
	31		—		9750		1001
	100		1818		—		—
	—		—		14595		3403
	293		—		—		—

(21)	365	(22)	300	(23)	75960800
	807		75		225000
	560		2		140
	25		47		—
	37		33		76185940
	101		9784		—
	—		20150		—
	1895		765091		—
	—		1075047		—
	—		1870529		—

PRACTICAL EXERCISES.

(24)	35	(25)	275	(26)	\$ 30	(27)	\$ 50	(28)	Miles.
	21		196		12		25		33
	—		—		5		125		40
	56		471		—		216		35
	—		—		\$ 47		—		—
	—		—		—		416		145

<i>Sheep.</i>		<i>bar.</i>		<i>\$</i>	
(29)	A's 34	(30)	25	(31)	8
	B's 47		15		15
	C's 54		40		19
	—		9		12
	135		—		—
	—		89		54

for 2000
550 2750

950 \$4750

MULTIPLICATION.

7

MULTIPLICATION.

CASE I.

EXAMPLES.

(8) 3948769768
3

11846309304

(9) 87051298
4

348205192

(10) 976201608769
5

4881008493845

(11) 456978426976
6

2741870561856

(14) 28769842369
9

258928581321

(16) 5697698976945
11

62674688745295

(18) 84976876969
12

1019722523868

(12) 8079698769
7

56560691388

(15) 769829769478
10

7698297694780

(17) 7029876956
12

84358523472

(19) 9021681409671
12

108260176916052

(20) 4218
2

8436

(21) 7321
3

21963

(22) 87692
4

350768

(23) 95698
5

478490

(24) 10691
6

(25) 31078
7

(26) 109019
8

872152

(27) 900078
9

8100702

8

MULTIPLICATION.

(28) 826870

10

8268700

(29) 278976

11

3068736

(30) 12569769

12

150837228

CASE 2.

EXAMPLES.

(34) 39786948

197

278508636

358082532

39786948

7838028756

(35) 4978829

408

39830632

19915316

2031362232

(36) 8735698

5706

52414188

61149886

43678490

49845892788

(37) 84016978

3761

84016978

504101868

588118846

252050934

315987854258

(38) 49569876

4817

346989132

49569876

396559008

198279504

238778092692

(39) 9637842

9078

77102736

67464894

86740578

87492329676

(40) 9786

13

29358

9786

127218

(41) 8475

29

76275

16950

245775

(42) 11271

35

66355

33813

394485

MULTIPLICATION.

9

(43) 19004
 305

$$\begin{array}{r} 95020 \\ 57012 \\ \hline 5796220 \end{array}$$

(44) 76976
 489

$$\begin{array}{r} 692784 \\ 615808 \\ \hline 307904 \end{array}$$

$$\begin{array}{r} 37641264 \\ \hline \end{array}$$

(45) 84769
 976

$$\begin{array}{r} 508614 \\ 593383 \\ \hline 762921 \end{array}$$

$$\begin{array}{r} 82734544 \\ \hline \end{array}$$

(46) 1978987
 4809

$$\begin{array}{r} 17810883 \\ 15831896 \\ 7915948 \\ \hline 9516948483 \end{array}$$

(47) 9807094
 5047

$$\begin{array}{r} 68649658 \\ 39228376 \\ 49035470 \\ \hline 49496403418 \end{array}$$

CASE 3.

EXAMPLES.

(48) 37 | 00
 2 | 00

740000

(49) 4870
 25 | 00

24350
9740

12175000

(50) 4087 | 00
 906 | 000

24522
36783

370282200000

(51) 876956
 99 | 0000

7892604
7892604

868186440000

SUBTRACTION.

CASE 4.

EXAMPLES.

(53) 8976	(54) 7696	(55) 87698	(56) 20784
6	9	9	12
<u>53856</u>	<u>69264</u>	<u>789282</u>	<u>249408</u>
8	9	8	9
<u>430848</u>	<u>623376</u>	<u>6314256</u>	<u>2244672</u>
(57) 81207	(58) 47696	(59) 75687	(60) 34075
11	12	7	6
<u>893277</u>	<u>572352</u>	<u>529809</u>	<u>204450</u>
12	12	8	6
<u>10719324</u>	<u>6868224</u>	<u>4238472</u>	<u>1226700</u>

PRACTICAL EXERCISES.

(61) \$25	(62) 15	(63) \$250	(64) \$150
5	4	7	4
<u>\$125</u>	<u>60</u>	<u>\$1750</u>	<u>\$600</u>
(65) \$100	Or thus,	100	66) 18175
25		5	14
<u>500</u>		<u>500</u>	<u>72700</u>
200		5	18175
<u>\$2500</u>		<u>\$2500</u>	<u>254450</u>

•••••

SUBTRACTION.

EXAMPLES.

(4) 859768	(5) 9076048	(6) 532147878
124978	7940689	139876956
<u>734790</u>	<u>1135359</u>	<u>392270922</u>

DIVISION.

11

$$\begin{array}{r} 100000 \\ - 84321 \\ \hline 15679 \end{array}$$

$$\begin{array}{r} 75381478 \\ - 39040217 \\ \hline 36341261 \end{array}$$

$$\begin{array}{r} 102070845 \\ - 19768799 \\ \hline 82302046 \end{array}$$

(10) 196

(11) 487

(12) 875

(13) 967

(14) 1001

37

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159

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12

DIVISION.

(10) $5) \underline{849768769}$
 $\underline{169953753+4}$

(11) $6) \underline{756976874}$
 $\underline{126162812+2}$

(12) $7) \underline{87694213628}$
 $\underline{12527744804}$

(13) $8) \underline{80269687}$
 $\underline{10033710+7}$

(14) $9) \underline{376948769}$
 $\underline{41883196+5}$

(15) $11) \underline{876956788}$
 $\underline{79723344+4}$

(16) $12) \underline{4976876946782}$
 $\underline{414739745565+2}$

(17) $12) \underline{89769762048769}$
 $\underline{7480813504064+1}$

(18) $2) \underline{3976}$
 $\underline{1988}$

(19) $3) \underline{8769}$
 $\underline{2923}$

(20) $4) \underline{47876}$
 $\underline{11969}$

(21) $5) \underline{8767}$
 $\underline{1753+2}$

(22) $6) \underline{9698}$
 $\underline{1616+2}$

(23) $7) \underline{97899}$
 $\underline{13985+4}$

(24) $8) \underline{80409}$
 $\underline{10051+1}$

(25) $9) \underline{981021}$
 $\underline{109002+3}$

(26) $10) \underline{897697}$
 $\underline{89769+7}$

(27) $11) \underline{9876978}$
 $\underline{897907+1}$

(28) $12) \underline{4967844}$
 $\underline{413987}$

PRACTICAL EXERCISES.

(29) $2) \underline{12}$
 $\underline{6}$

(30) $7) \underline{350}$
 $\underline{50}$

(31) $8) \underline{8736}$
 $\underline{4)1092}$

(32) $3) \underline{3966}$
 $\underline{1322}$

 $\underline{273}$

LONG DIVISION.

EXAMPLES.

(35) 13)875(67

$$\begin{array}{r} 78 \\ \hline 95 \\ - 91 \\ \hline 4 \\ \hline \end{array}$$

(36) 15)476(31

$$\begin{array}{r} 45 \\ \hline 26 \\ - 15 \\ \hline 11 \\ \hline \end{array}$$

(37) 18)958(53

$$\begin{array}{r} 90 \\ \hline 58 \\ - 54 \\ \hline 4 \\ \hline \end{array}$$

(38) 28)1475(52

$$\begin{array}{r} 140 \\ \hline 75 \\ - 56 \\ \hline 19 \\ \hline \end{array}$$

(39) 31)4277(137

$$\begin{array}{r} 31 \\ \hline 117 \\ - 93 \\ \hline 247 \\ - 217 \\ \hline 30 \\ \hline \end{array}$$

(40) 37)25757(696

$$\begin{array}{r} 222 \\ \hline 355 \\ - 333 \\ \hline 227 \\ - 222 \\ \hline 5 \\ \hline \end{array}$$

(41) 41)256976(6267

$$\begin{array}{r} 246 \\ \hline 109 \\ - 82 \\ \hline 277 \\ - 246 \\ \hline 316 \\ - 287 \\ \hline 29 \\ \hline \end{array}$$

(42) 48)337979(7041

$$\begin{array}{r} 336 \\ \hline 197 \\ - 192 \\ \hline 59 \\ - 48 \\ \hline 11 \\ \hline \end{array}$$

14

LONG DIVISION.

(43) 59)997816(16912

59	98
407	199
354	196
538	387
531	294
71	936
59	882
126	549
118	490
8	595
—	588
	7

(45) 125)4697680424(37581443 (46) 396)387690204986(979015663

375	3564
947	3129
875	2772
726	3570
625	3564
1018	620
1000	396
180	2244
125	1980
554	2648
500	2376
542	2728
500	2376
424	3526
375	3168
49	358

LONG DIVISION.

15

(47) 8704876080048789550833932	(48) 147897608680004086833576454
4380	7390
4960	13798
4380	13302
5802	4962
5256	4434
5460	5286
5256	4434
2040	8520
1752	7390
2884	11300
2628	10346
2568	9540
1752	8888
8167	6724
7884	5912
2836	8120
2628	7390
2089	7302
1752	5912
337	1390

16

LONG DIVISION.

(49) 8769698760768720497(1198974501 (50) 97080|00000976478076|000001806

87696	87912
110737	18527
87696	9768
230416	87598
175392	78144
550248	94549
526176	87912
240727	66377
175392	58608
653352	77696
613872	—
394800	
350784	
440164	
438480	
168497	
87696	
80801	

(51) 1476980|00000)4789768214|00000(3242 Ans.

4430940

358828229539606343221590792043530142953960Rem. 1399054

LONG DIVISION.

17

PRACTICAL EXERCISES.

$$(52) \quad 45) 9847(218$$

90

84

45

397

360

Rem. 37

$$(53) \quad 391) 1259678(3221$$

1173

866

782

847

782

658

391

Rem. 267

$$(54) \quad 148) 225476(1523$$

148

774

740

347

296

516

444

Rem. 72

$$(55) \quad 25) 375(15 \text{ bushels.}$$

25

125

125

18

LONG DIVISION.

(56)
$$\begin{array}{r} 75 \\ \overline{)87735825} \\ 75 \\ \hline 127 \end{array}$$

127

75

523

450

735

675

608

600

82

75

75

75

(57)
$$\begin{array}{r} 49850 \\ \overline{)99700} \\ 99700 \\ \hline 0 \end{array}$$

When the divisor is the exact product of any two figures multiplied together.

EXAMPLES.

(61)
$$\begin{array}{r} 5 \\ \overline{)9756} \end{array}$$

$$\begin{array}{r} 7 \\ \overline{)1951+1} \end{array}$$
 1st Rem.

$$\begin{array}{r} 278+5 \\ \times 5 \end{array}$$
 2d Rem.

$$\begin{array}{r} 25+1=26 \end{array}$$

(62)
$$\begin{array}{r} 8 \\ \overline{)8491} \end{array}$$

$$\begin{array}{r} 9 \\ \overline{)943+4} \end{array}$$

$$\begin{array}{r} 104+7\times 9+4=67 \\ \hline \end{array}$$

(63)
$$\begin{array}{r} 9 \\ \overline{)44767} \end{array}$$

$$\begin{array}{r} 2 \\ \overline{)4974+1} \end{array}$$
 Rem.

$$\begin{array}{r} 2487 \\ \hline \end{array}$$

(64)
$$\begin{array}{r} 7 \\ \overline{)92017} \end{array}$$

$$\begin{array}{r} 8 \\ \overline{)13145+2} \end{array}$$

Rem.

$$\begin{array}{r} 1643+1\times 7+2=9 \\ \hline \end{array}$$

LONG DIVISION.

19

(65) 11)55210

9)5019+1

557+6\times11+1=67

Rem.

8)6458+3

807+2\times6+3=15

Rem.

(67) 12)99876

9)8323

924+7\times12=84

(68) 12)37967

12)3163+11

263+7\times12+11=95

Rem.

PRACTICAL EXERCISES.

(69) 5)3775

5)755

Ans. 151

(70) 12)480

8)40

Ans. 5 ~~15~~

(71) 12)14400

12)1200

Ans. 100

(72) 12)1800

6)150

Ans. 25

(73) 12)396

11)33

Ans. ~~3~~3

EXAMPLES IN ADDITION, MULTIPLICATION, SUBTRACTION
AND DIVISION.

(1) 50

50

100

-25

—

75 Ans.

(2) 40 10

20 10

2)20 20

Ans. 10

(3) 25000

13000

2)12000

\$6000

20

COMPOUND ADDITION.

(4) Bought 8200 Sold 3756 (5) 50)2450(49 miles. Ans.

5000 4879 200

13200 8635 450
8635 — 450Ans. 4565(6) Bought 24 bags, containing 3000 lbs
Sold 15 1736

Remains — bags, containing 1264 lbs

(7) Days 365)2920(8 dols. per day. Yearly income 2920
2920

Saves per year \$1151

COMPOUND ADDITION.

FEDERAL MONEY.

EXAMPLES.

	\$	cis.	m.
(2)	46	75	5
	79	37	8
	43	50	0
	97	37	5
	<u>3267.</u>	<u>00</u>	<u>8</u>

	\$	cis.	m.
(3)	37	68	3
	95	37	1
	43	25	
	79	56	1
	<u>3255.</u>	<u>87</u>	<u>1</u>

	\$	cis.
(4)	72	62
	85	87
	20	12
	45	18
	94	37
	42	68
	79	18
	<u>3440.</u>	<u>06</u>

COMPOUND ADDITION.

21

	\$	cts.		\$	cts.		\$	cts.
(5)	54	75	(6)	29	25	(7)	1	18 $\frac{1}{2}$
	37	37 $\frac{1}{2}$		34	37 $\frac{1}{2}$		2	50
	93	18 $\frac{1}{2}$		188	68 $\frac{1}{2}$			87 $\frac{1}{2}$
	149	87 $\frac{1}{2}$		265	12 $\frac{1}{2}$			93 $\frac{1}{2}$
	503	68 $\frac{1}{2}$		1783	18 $\frac{1}{2}$		1	87 $\frac{1}{2}$
	979	12 $\frac{1}{2}$		8579	56 $\frac{1}{2}$		2	68 $\frac{1}{2}$
	2194	18 $\frac{1}{2}$		6	87 $\frac{1}{2}$			37 $\frac{1}{2}$
	<u>\$4012</u>	<u>18$\frac{1}{2}$</u>		<u>\$10887</u>	<u>06$\frac{1}{2}$</u>		1	<u>87$\frac{1}{2}$</u>
							<u>\$13</u>	<u>25</u>

	\$	cts.		\$	cts.
(8)	5	00	(9)	1	87 $\frac{1}{2}$
	18	50		1	68 $\frac{1}{2}$
	8	87 $\frac{1}{2}$		0	43 $\frac{1}{2}$
	1	18 $\frac{1}{2}$		1	37 $\frac{1}{2}$
	14	50		0	93 $\frac{1}{2}$
	0	87 $\frac{1}{2}$		0	56 $\frac{1}{2}$
	5	37 $\frac{1}{2}$		0	37 $\frac{1}{2}$
	7	87 $\frac{1}{2}$		0	31 $\frac{1}{2}$
	20	00		0	12 $\frac{1}{2}$
	<u>\$82</u>	<u>18$\frac{1}{2}$</u>		<u>\$7</u>	<u>68$\frac{1}{2}$</u>

STERLING MONEY.

EXAMPLES.

	£	s.	d.		£	s.	d.		£	s.	d.
(2)	7	9	4 $\frac{1}{2}$	(3)	4	6	4	(4)	565	3	7
	13	7	6 $\frac{1}{2}$		47	19	7		382	13	5
	4	5	2		159	5	3		592	9	2
	10	18	10 $\frac{3}{4}$		78	6	11 $\frac{3}{4}$		856	17	3
	<u>Ans. 36</u>	<u>1</u>	<u>0</u>		<u>Ans. 289</u>	<u>18</u>	<u>1$\frac{1}{4}$</u>		<u>Ans. 2656</u>	<u>13</u>	<u>1</u>

COMPOUND ADDITION.

	<i>£</i>	<i>s.</i>	<i>d.</i>		<i>£</i>	<i>s.</i>	<i>d.</i>		<i>£</i>	<i>s.</i>	<i>d.</i>
(5)	142	16	7	(6)	763	7	4	(7)	69	18	7
	489	3	4		39	4	9		175	2	6
	726	15	9		162	17	2		1582	19	4
	573	4	8		459	15	0		175	13	8
	628	12	6		473	12	8		143	13	8
									212	0	7
Ans.	2560	12	10	Ans.	1898	16	11	Ans.	2359	8	5

	<i>£</i>	<i>s.</i>	<i>d.</i>		<i>£</i>	<i>s.</i>	<i>d.</i>
(8)	1776	12	8	(9)	985	4	9
	412	16	5		186	13	4
	369	7	2		1569	18	4
	469	15	10		183	0	8
	573	19	2		0	17	4
	1987	14	8		0	0	7
	4823	15	11				
				Ans.	2925	15	0
Ans.	10414	1	10				

AVOIRDUPUIS WEIGHT.

	<i>T. cut.</i>	<i>qr.</i>	<i>lb.</i>	<i>oz.</i>	<i>dr.</i>		<i>T. cut.</i>	<i>qr.</i>	<i>lb.</i>	<i>oz.</i>	<i>dr.</i>	
(2)	7	11	2	16	4	13	(3)	12	16	1	19	15
	15	7	3	8	16	7		114	10	2	12	4
	138	19	1	12	8	13		72	4	2	24	14
	42	8	3	19	12	4		176	15	3	4	15
	357	6	2	8	3	3						
							Ans.	376	7	2	6	1
Ans.	561	14	1	7	13	8						

	<i>T. cut.</i>	<i>qr.</i>	<i>lb.</i>	<i>oz.</i>	<i>dr.</i>
(4)	139	19	3	18	13
	1754	10	2	11	2
	27	3	0	14	11
	0	13	0	0	13
					0
Ans.	1922	6	2	17	8

COMPOUND ADDITION.

23

TROY WEIGHT.

<i>lbs.</i>	<i>oz.</i>	<i>dwt.</i>	<i>gr.</i>	<i>lbs.</i>	<i>oz.</i>	<i>dwt.</i>	<i>gr.</i>	<i>lbs.</i>	<i>oz.</i>	<i>dwt.</i>	<i>gr.</i>	
(2) 185	2	19	20	(3) 16	4	18	6	(4) 172	11	19	22	
56	9	15	6	7	9	11	22	12	4	13	12	
1472	11	2	17	163	7	12	18	18	5	11	20	
385	0	8	5	17	0	13	0	119	11	13	18	
10	8	7	12					0	0	2	13	
				Ana.	204	10	15	22	0	10	0	20
A.2110	8	13	12									
								Ans.	324	8	2	9

APOTHECARIES' WEIGHT.

<i>lb.</i>	<i>oz.</i>														
(2) 84	7	6	0	12	(3) 18	0	1	0	12	(4) 182	3	1	0		
132	5	0	2	0	175	10	5	0	10	12	1	0	2	17	
16	2	2	2	8	472	3	1	2	3	17	2	4	2	15	
1427	6	7	0	19	0	11	7	2	0	010	2	1	19		
14	0	6	1	9											
					Ana.	667	1	7	2	5	An.212	5	1	1	11
A.1674	10	7	1	8											

LONG MEASURE.

<i>yd.</i>	<i>ft.</i>	<i>in.</i>	<i>L.</i>	<i>m.</i>	<i>f.</i>	<i>p.</i>	<i>yd.</i>	<i>ft.</i>	<i>in.</i>	<i>L.</i>	<i>m.</i>	<i>f.</i>	<i>p.</i>	<i>yd.</i>	<i>ft.</i>	<i>in.</i>		
(2) 3	2	11	(3) 172	2	3	19	2	2	4	(4) 462	1	7	29	1	1	10		
1	1	9		0	0	14	1	0	3		0	0	11	0	1	10		
2	0	8		0	1	2	29	0	0	10		4	1	2	28	1	2	9
3	1	10		0	0	4	0	0	0		0	0	0	18	0	0	0	
2	0	4		0	0	2	0	0	0	10								
6	2	7		0	0	0	8	2	3	Ana.	467	0	3	1	4	0	5	

Ans.20 1 1 Ans.173 1 4 23 2 1 0 6

CLOTH MEASURE.

<i>E. E.</i>	<i>gr.</i>	<i>n.</i>	<i>E. F.</i>	<i>gr.</i>	<i>n.</i>		
(2)	72	3	2	19	2	3	
	536	2	1	728	1	2	
	847	1	3	142	0	1	
	1458	0	2	816	0	0	
	41	2	0	32	1	2	
Ans.	2951	0	0	Ans.	1739	0	0

COMPOUND ADDITION.

	<i>yd.</i>	<i>qr.</i>	<i>na.</i>		<i>E.</i>	<i>Fr.</i>	<i>qr.</i>	<i>na.</i>
(4)	19	2	3	(5)	143	0	3	
	14	2	0		17	2	2	
	32	0	2		172	1	1	
	0	3	1		182	1	3	
	142	3	2		132	3	2	
					72	1	1	
Ans.	210	0	0					
				Ans.	720	1	0	

LAND MEASURE.

ANSWER		
A. R. P.	A. R. P.	A. R. P.
(2) 487 2 17	(3) 22 2 0	(4) 132 3 25
25 3 28	700 3 27	654 0 17
67 0 32	47 0 5	462 3 25
45 1 16	39 0 0	16 0 4
26 0 29	47 2 39	1065 3 38
<hr/>	0 3 28	<hr/>
Ans. 652 1 2	<hr/>	Ans. 2931 3 29
	Ans. 252 0 19	

LIQUID MEASURE

DRY MEASURE

	B. p. qt. pt.	B. p. qt. pt.	B. p. qt. pt.
(2)	47 2 4 1	754 2 5 0	144 3 2 1
	635 0 3 0	469 0 2 0	0 1 2 0
	247 3 0 1	385 2 7 1	0 0 3 1
	285 0 2 0	375 0 0 1	462 3 0 1
	734 2 5 0	0 3 2 0	72 0 5 1
Ans.	1950 0 7 0	1985 1 1 0	680 0 6 0

COMPOUND ADDITION.

25

TIME.

	<i>Y. m. w. d. h. m. sec.</i>	<i>Y. m. w. d. h. m. sec.</i>
(3)	172 0 1 0 4 0 52	(4) 462 4 0 0 5 37 24
	0 0 0 0 0 34 18	62 0 0 0 11 0 24
	15 4 0 5 3 27 0	0 0 1 5 0 13 0
	0 0 1 3 21 35 18	0 6 1 4 13 12 37

Ans. 187 4 3 2 5 37 28

Ans. 524 10 3 3 6 3 25

MOTION, OR CIRCLE MEASURE.

	<i>sig. ° ' "</i>	<i>sig. ° ' "</i>	<i>sig. ° ' "</i>
(2)	2 7 32 16	(3) 5 10 46 38	(4) 0 0 45 0
	0 5 27 24	0 11 37 18	1 9 0 18
	1 6 17 13	1 0 47 12	0 14 21 34
	0 7 38 24	0 0 0 18	2 8 13 54
	4 5 42 19	2 0 0 52	4 7 12 19
		1 15 12 23	0 0 47 32
Ans.	8 2 37 36	0 11 57 29	

Ans. 10 20 22 10

Ans. 8 10 20 37

APPLICATION.

	<i>\$ cts.</i>	<i>Y. qr. na.</i>	<i>B. p. qt.</i>
(1)	375 45	(2) 57 2 0	(3) 2 2 0
	142 37 $\frac{1}{2}$	29 3 2	3 3 5
	1375 56 $\frac{1}{4}$	45 1 0	3 1 1
		32 3 1	2 0 4
Ans.	1893 38 $\frac{3}{4}$	38 2 0	
		38 2 0	Ans. 11 3 2

Ans. 242 1 3

A. R. P.

(4)	142 2 0
	32 3 12
	108 3 18

Ans. 284 0 30

Y. qr. na.

(5)	15 3 0
	18 1 2
	25 3 2

Ans. 60 0 0

26

COMPOUND MULTIPLICATION.

M. fur. p.

$$(6) \begin{array}{r} 43 \\ \times 29 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 3 \\ 0 \\ 34 \\ \hline 232 \end{array}$$

$$\begin{array}{r} 57 \\ \times 12 \\ \hline 18 \end{array}$$

$$\text{Ans. } \underline{\underline{142 \quad 2 \quad 4}}$$

B. p. qt.

$$(7) \begin{array}{r} 756 \\ \times 756 \\ \hline 854 \end{array}$$

$$\begin{array}{r} 2 \\ 0 \\ 2 \\ 0 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 854 \\ \times 854 \\ \hline 0 \end{array}$$

$$\text{Ans. } \underline{\underline{3977 \quad 3 \quad 2}}$$



COMPOUND MULTIPLICATION.

EXAMPLES.

FEDERAL MONEY.

$$(4) \begin{array}{r} \$ \quad cts. \\ 26 \quad 18\frac{3}{4} \\ \times \quad 6 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{157 \quad 12\frac{1}{2}}}$$

$$(5) \begin{array}{r} \$ \quad cts. \quad m. \\ 100 \quad 40 \quad 4 \\ \times \quad \quad \quad 10 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{1004 \quad 04 \quad 0}}$$

$$(6) \begin{array}{r} \$ \quad cts. \\ 56 \quad 18\frac{3}{4} \\ \times \quad 9 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{505 \quad 68\frac{3}{4}}}$$

$$(7) \begin{array}{r} \$ \quad cts. \quad m. \\ 25 \quad 37 \quad 5 \\ \times \quad \quad \quad 8 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{203 \quad 00 \quad 0}}$$

$$(8) \begin{array}{r} \$ \quad cts. \\ 565 \quad 62\frac{1}{4} \\ \times \quad 12 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{6787 \quad 50}}$$

ENGLISH MONEY.

$$(2) \begin{array}{r} £ \quad s. \quad d. \\ 14 \quad 6 \quad 0\frac{1}{4} \\ \times \quad \quad \quad 9 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{128 \quad 14 \quad 2\frac{1}{4}}}$$

$$(3) \begin{array}{r} £ \quad s. \quad d. \\ 111 \quad 11 \quad 10\frac{1}{4} \\ \times \quad \quad \quad 10 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{1115 \quad 10 \quad 9}}$$

COMPOUND MULTIPLICATION.

27

$$(4) \begin{array}{r} \text{£} \\ 37 \\ 6 \\ 5 \end{array} \begin{array}{r} s. \\ 9\frac{1}{2} \\ \hline 5 \end{array}$$

$$\text{Ans. } \underline{186 \ 13 \ 11\frac{1}{2}}$$

$$(5) \begin{array}{r} \text{£} \\ 56 \\ 8 \\ 9 \end{array} \begin{array}{r} s. \\ 7\frac{3}{4} \\ \hline 9 \end{array}$$

$$\text{Ans. } \underline{507 \ 17 \ 9\frac{3}{4}}$$

AVOIRDUPOIS WEIGHT.

T.cwt. qr. lb. oz. dr.

$$(2) \begin{array}{r} 6 \\ 14 \\ 2 \\ 7 \\ 5 \\ 2 \\ 4 \end{array}$$

$$\text{Ans. } \underline{26 \ 18 \ 1 \ 1 \ 4 \ 8}$$

qr. lb. oz. dr.

$$(3) \begin{array}{r} 3 \\ 16 \\ 7 \\ 8 \\ 10 \end{array}$$

$$\text{Ans. } \underline{8 \ 3 \ 24 \ 11 \ 0}$$

$$(4) \begin{array}{r} \text{Cwt. qr. lb.} \\ 1 \\ 2 \\ 6 \\ 10 \end{array}$$

$$\text{Ans. } \underline{15 \ 2 \ 4}$$

$$(5) \begin{array}{r} \text{Cwt. qr. lb.} \\ 4 \\ 3 \\ 17 \\ 11 \end{array}$$

$$\text{Ans. } \underline{53 \ 3 \ 19}$$

TROY WEIGHT.

lb. oz. dwt. gr.

$$(2) \begin{array}{r} 43 \\ 0 \\ 8 \\ 10 \\ 4 \end{array}$$

lb. oz. dwt. gr.

$$(3) \begin{array}{r} 113 \\ 6 \\ 0 \\ 6 \\ 4 \end{array}$$

lb. oz. dwt.

$$(4) \begin{array}{r} 17 \\ 9 \\ 14 \\ 10 \\ 6 \end{array}$$

$$\text{Ans. } \underline{172 \ 1 \ 13 \ 16} \quad \text{Ans. } \underline{681 \ 0 \ 1 \ 12} \quad \text{Ans. } \underline{178 \ 1 \ 0}$$

$$(5) \begin{array}{r} \text{lbs. oz. dwt. gr.} \\ 41 \\ 6 \\ 18 \\ 2 \\ 7 \end{array}$$

$$\text{Ans. } \underline{291 \ 0 \ 6 \ 14}$$

$$(6) \begin{array}{r} \text{lbs. oz. dwt. gr.} \\ 91 \\ 4 \\ 14 \\ 16 \\ 8 \end{array}$$

$$\text{Ans. } \underline{731 \ 1 \ 17 \ 8}$$

APOTHECARIES' WEIGHT.

lb. 3 3 D gr.

$$(2) \begin{array}{r} 53 \\ 10 \\ 0 \\ 2 \\ 12 \\ 9 \end{array}$$

lb. 3 3 D gr.

$$(3) \begin{array}{r} 17 \\ 5 \\ 6 \\ 1 \\ 4 \\ 12 \end{array}$$

$$\text{Ans. } \underline{484 \ 6 \ 7 \ 2 \ 8}$$

$$\text{Ans. } \underline{209 \ 9 \ 4 \ 2 \ 8}$$

COMPOUND MULTIPLICATION.

$$(4) \begin{array}{r} \text{lb.} \\ 76 \\ 4 \quad 1 \\ \hline 9 \end{array}$$

$$(5) \begin{array}{r} \text{lb.} \\ 95 \\ 1 \quad 2 \\ \hline 11 \end{array}$$

$$\text{Ans. } \underline{\underline{687 \quad 1 \quad 7 \quad 0}}$$

$$\text{Ans. } \underline{\underline{1046 \quad 2 \quad 3 \quad 2 \quad 1}}$$

LONG MEASURE.

$$(2) \begin{array}{r} L. M. fur. p. \\ 4 \quad 2 \quad 2 \quad 29 \\ \hline 7 \end{array}$$

$$(3) \begin{array}{r} M. fur. p. yd. ft. in. \\ 18 \quad 3 \quad 20 \quad 1 \quad 2 \quad 10 \\ \hline 5 \end{array}$$

$$\text{Ans. } \underline{\underline{33 \quad 1 \quad 3 \quad 3}}$$

$$\text{Ans. } \underline{\underline{92 \quad 1 \quad 21 \quad 3\frac{1}{3} \quad 2 \quad 2}}$$

$$(4) \begin{array}{r} \text{Deg. m. fur.} \\ 6 \quad 40 \quad 7 \\ \hline 10 \end{array}$$

$$(5) \begin{array}{r} M. fur. p. \\ 44 \quad 6 \quad 20 \\ \hline 7 \end{array}$$

$$\text{Ans. } \underline{\underline{66 \quad 48 \quad 6}}$$

$$\text{Ans. } \underline{\underline{313 \quad 5 \quad 20}}$$

CLOTH MEASURE.

$$(2) \begin{array}{r} E.E. qr. na. \\ 37 \quad 4 \quad 2 \\ \hline 8 \end{array}$$

$$(3) \begin{array}{r} E.Fl. qr. na. \\ 18 \quad 0 \quad 3 \\ \hline 12 \end{array}$$

$$(4) \begin{array}{r} E.Fr. qr. na. \\ 14 \quad 1 \quad 3 \\ \hline 9 \end{array}$$

$$\text{Ans. } \underline{\underline{303 \quad 1 \quad 0}}$$

$$\text{Ans. } \underline{\underline{219 \quad 0 \quad 0}}$$

$$\text{Ans. } \underline{\underline{129 \quad 0 \quad 3}}$$

$$(5) \begin{array}{r} Yds. qr. na. \\ 19 \quad 1 \quad 2 \\ \hline 5 \end{array}$$

$$(6) \begin{array}{r} E. E. qr. \\ 56 \quad 3 \\ \hline 9 \end{array}$$

$$\text{Ans. } \underline{\underline{96 \quad 3 \quad 2}}$$

$$\text{Ans. } \underline{\underline{509 \quad 2}}$$

LAND MEASURE.

$$(2) \begin{array}{r} A.R.P. \\ 19 \quad 3 \quad 20 \\ \hline 6 \end{array}$$

$$(3) \begin{array}{r} A.R.P. \\ 10 \quad 0 \quad 33 \\ \hline 9 \end{array}$$

$$(4) \begin{array}{r} A.R.P. \\ 1 \quad 3 \quad 11 \\ \hline 10 \end{array}$$

$$(5) \begin{array}{r} A.R.P. \\ 63 \quad 3 \quad 18 \\ \hline 11 \end{array}$$

$$\text{Ans. } \underline{\underline{119 \quad 1 \quad 00}} \text{ Ans. } \underline{\underline{91 \quad 3 \quad 17}} \text{ Ans. } \underline{\underline{18 \quad 0 \quad 30}} \text{ Ans. } \underline{\underline{702 \quad 1 \quad 38}}$$

COMPOUND MULTIPLICATION.

29

LIQUID MEASURE.

$$(2) \begin{array}{r} T. hhd. gal. qt. pt. \\ 1 \ 2 \ 16 \ 3 \ 1 \\ \hline 10 \end{array}$$

$$\text{Ans. } \underline{15 \ 2 \ 42 \ 3 \ 0}$$

$$(3) \begin{array}{r} P. hhd. gal. qt. pt. \\ 4 \ 1 \ 19 \ 3 \ 1 \\ \hline 5 \end{array}$$

$$\text{Ans. } \underline{23 \ 0 \ 36 \ 1 \ 1}$$

$$(4) \begin{array}{r} T. h. gal. qt. \\ 3 \ 2 \ 50 \ 2 \\ \hline 8 \end{array}$$

$$\text{Ans. } \underline{29 \ 2 \ 26 \ 0}$$

$$(5) \begin{array}{r} H. gal. q. pt. \\ 4 \ 41 \ 0 \ 1 \\ \hline 10 \end{array}$$

$$\text{Ans. } \underline{46 \ 33 \ 1 \ 0}$$

DRY MEASURE.

$$(2) \begin{array}{r} Bu. pe. qt. pt. \\ 1 \ 3 \ 3 \ 1 \\ \hline 4 \end{array}$$

$$\text{Ans. } \underline{7 \ 1 \ 6 \ 0}$$

$$(3) \begin{array}{r} Bu. pe. qt. pt. \\ 110 \ 3 \ 0 \ 1 \\ \hline 4 \end{array}$$

$$\text{Ans. } \underline{443 \ 0 \ 2 \ 0}$$

$$(4) \begin{array}{r} R. pe. qt. pt. \\ 44 \ 0 \ 0 \ 1 \\ \hline 7 \end{array}$$

$$\text{Ans. } \underline{308 \ 0 \ 3 \ 1}$$

$$(5) \begin{array}{r} P. qt. \\ 3 \ 1 \\ \hline 9 \end{array}$$

$$\text{Ans. } \underline{Bush. \ 7 \ 0 \ 1}$$

TIME.

$$(2) \begin{array}{r} Y. m. w. d. h. min. sec. \\ 17 \ 8 \ 2 \ 6 \ 4 \ 40 \ 18 \\ \hline 6 \end{array}$$

$$\text{Ans. } \underline{106 \ 4 \ 1 \ 2 \ 4 \ 1 \ 48}$$

$$(3) \begin{array}{r} W. d. h. \\ 3 \ 5 \ 22 \\ \hline 12 \end{array}$$

$$\text{Ans. } \underline{46 \ 1 \ 0}$$

$$(4) \begin{array}{r} Y. m. w. d. \\ 7 \ 0 \ 4 \ 4 \\ \hline 9 \end{array}$$

$$\text{Ans. } \underline{63 \ 10 \ 1 \ 1}$$

$$(5) \begin{array}{r} Y. m. w. d. \\ 15 \ 2 \ 0 \ 6 \\ \hline 8 \end{array}$$

$$\text{Ans. } \underline{121 \ 5 \ 2 \ 6}$$

RULE 2.

EXAMPLES.

$$(2) \text{ Multiply } \begin{array}{r} \text{£ s. d.} \\ 37 \ 10 \ 6\frac{3}{4} \end{array} \text{ by } 48 \quad (3) \begin{array}{r} \text{£ cts. m.} \\ 86 \ 37 \ 5 \end{array} \text{ by } 36 \\ 6 \times 8=48 \qquad \qquad 6 \times 6=36$$

$$\begin{array}{r} 225 \ 3 \ 4\frac{1}{2} \\ -8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } 1801 \ 7 \ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 398 \ 25 \ 0 \\ -6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } 2389 \ 50 \ 0 \\ \hline \end{array}$$

$$(4) \begin{array}{r} \text{£ cts. m.} \\ 44 \ 25 \ 3 \end{array} \text{ by } 56 \quad 7 \times 8=56$$

$$\begin{array}{r} 309 \ 77 \ 1 \\ -8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } 2478 \ 16 \ 8 \\ \hline \end{array}$$

$$(5) \begin{array}{r} \text{£ cts.} \\ 12 \ 18\frac{3}{4} \end{array} \text{ by } 96 \quad 12 \times 8=96$$

$$\begin{array}{r} 146 \ 25 \\ -8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } 1170 \ 60 \\ \hline \end{array}$$

$$(6) \begin{array}{r} \text{£ s. d.} \\ 45 \ 6 \ 9\frac{1}{2} \end{array} \text{ by } 120 \quad 12 \times 10=120$$

$$\begin{array}{r} 544 \ 1 \ 6 \\ -10 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } 5440 \ 15 \ 0 \\ \hline \end{array}$$

$$(7) \begin{array}{r} \text{£ s. d.} \\ 96 \ 12 \ 3\frac{3}{4} \end{array} \text{ by } 144 \quad 12 \times 12=144$$

$$\begin{array}{r} 1159 \ 7 \ 9 \\ -12 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } 13912 \ 13 \ 0 \\ \hline \end{array}$$

$$(8) \begin{array}{r} \text{A. R. P.} \\ 47 \ 3 \ 20 \end{array} \text{ by } 54 \quad 6 \times 9=54$$

$$\begin{array}{r} 287 \ 1 \ 0 \\ -9 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } 2585 \ 1 \ 0 \\ \hline \end{array}$$

$$(9) \begin{array}{r} \text{M. f. p.} \\ 48 \ 7 \ 25 \end{array} \text{ by } 88 \quad 11 \times 8=88$$

$$\begin{array}{r} 538 \ 3 \ 35 \\ -8 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } 4307 \ 7 \ 0 \\ \hline \end{array}$$

COMPOUND MULTIPLICATION.

(10) lb. oz. dr.
 56 9 6 by 84
 12×7=84

$$\begin{array}{r} 681 \\ \times 7 \\ \hline 4772 \end{array}$$

$$\begin{array}{r} 9 \\ + 0 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 4772 \\ + 0 \\ \hline 4772 \end{array}$$

RULE 3.

EXAMPLES.

(2) Multiply $\begin{array}{r} \$ \\ 7 \\ \times 87\frac{1}{2} \\ \hline 11 \times 4 + 3 = 47 \end{array}$

$$\begin{array}{r} 86 \\ \times 4 \\ \hline 344 \end{array}$$

$$\begin{array}{r} 346 \\ - 23 \\ \hline 62\frac{1}{2} \end{array}$$

$$\begin{array}{r} 370 \\ + 12\frac{1}{2} \\ \hline 370 \end{array}$$

(3) $\begin{array}{r} \$ \\ 28 \\ \times 68\frac{3}{4} \\ \hline 11 \times 6 + 2 = 68 \end{array}$

$$\begin{array}{r} 315 \\ \times 6 \\ \hline 1890 \end{array}$$

$$\begin{array}{r} 1893 \\ - 57 \\ \hline 1336 \end{array}$$

$$\begin{array}{r} 950 \\ + 75 \\ \hline 950 \end{array}$$

(4) $\begin{array}{r} \$ \\ 49 \\ \times 75 \times 3 \\ \hline 12 \end{array}$

$$\begin{array}{r} 597 \\ - 7 \\ \hline 590 \end{array}$$

$$\begin{array}{r} 4179 \\ - 149 \\ \hline 3930 \end{array}$$

$$\begin{array}{r} 3930 \\ - 25 \\ \hline 3885 \end{array}$$

$$\begin{array}{r} 4328 \\ + 25 \\ \hline 4353 \end{array}$$

(5) $\begin{array}{r} \$ \\ 94 \\ \times 18\frac{3}{4} \times 1 \\ \hline 10 \end{array}$

$$\begin{array}{r} 941 \\ \times 3 \\ \hline 2823 \end{array}$$

$$\begin{array}{r} 2825 \\ - 94 \\ \hline 2731 \end{array}$$

$$\begin{array}{r} 2919 \\ + 81\frac{1}{4} \\ \hline 2919 \end{array}$$

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COMPOUND MULTIPLICATION.

$$(6) \begin{array}{r} \$ cts. \\ 42 31\frac{1}{4} \times 3 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 465 43\frac{1}{4} \\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 2327 18\frac{1}{4} \\ 126 98\frac{1}{4} \\ \hline \end{array}$$

$$\text{Ans. } 2454 12\frac{1}{4}$$

$$(7) \begin{array}{r} £ s. d. \\ 28 7 6\frac{1}{4} \times 1 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 113 10 2 \\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 794 11 2 \\ 28 7 6\frac{1}{4} \\ \hline \end{array}$$

$$\text{Ans. } 802 18 8\frac{1}{4}$$

$$(8) \begin{array}{r} £ s. d. \\ 34 8 4\frac{1}{4} \times 1 \\ \hline 11 \end{array}$$

$$\begin{array}{r} 378 12 4\frac{1}{4} \\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 2271 14 1\frac{1}{4} \\ 34 8 4\frac{1}{4} \\ \hline \end{array}$$

$$\text{Ans. } 2306 2 6\frac{1}{4}$$

$$(9) \begin{array}{r} Cwt. qr. lb. \\ 7 3 22 \times 1 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 79 1 24 \\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 397 1 8 \\ 7 3 22 \\ \hline \end{array}$$

$$\text{Ans. } 405 1 2$$

$$(10) \begin{array}{r} lbs. oz. drams. \\ 12 5 8 \times 3 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 149 4 16 \\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 448 2 8 \\ 37 4 4 \\ \hline \end{array}$$

$$\text{Ans. } 485 6 12$$

$$(11) \begin{array}{r} M f. p. \\ 4 6 21 \times 3 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 57 6 12 \\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 404 4 4 \\ 14 3 23 \\ \hline \end{array}$$

$$\text{Ans. } 418 7 27$$

RULE 4.

EXAMPLES.

$$(2) \text{ Multiply } \$ \ cts. \\ 1 \ 56\frac{1}{2} \times 6 \\ \hline 10$$

$$\begin{array}{r} 15 \\ 156 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 50 \\ 4 \\ \hline 626 \\ 78 \\ 9 \\ \hline 00 \\ 25 \\ 39 \end{array}$$

$$\text{Ans. } 713 \ 64$$

$$(3) \ \$ \ cts. \\ 2 \ 87\frac{1}{2} \times 6 \\ \hline 10$$

$$\begin{array}{r} 28 \\ 287 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 50 \\ 5 \\ \hline 1437 \\ 201 \\ 17 \\ \hline 50 \\ 25 \\ 25 \end{array}$$

$$\text{Ans. } 1656 \ 00$$

$$(4) \ \$ \ cts. \\ 4 \ 31\frac{1}{4} \times 9 \\ \hline 10$$

$$\begin{array}{r} 43 \\ 43 \\ \hline 12 \\ 10 \end{array}$$

$$\begin{array}{r} 25 \\ 6 \\ \hline 2587 \\ 301 \\ 38 \\ \hline 50 \\ 87\frac{1}{2} \\ 81\frac{1}{4} \end{array}$$

$$\text{Ans. } 2928 \ 18\frac{3}{4}$$

$$(5) \ \$ \ cts. \\ 18 \ 93\frac{3}{4} \times 7 \\ \hline 10$$

$$\begin{array}{r} 189 \\ 189 \\ \hline 37 \\ 10 \end{array}$$

$$\begin{array}{r} 75 \\ 4 \\ \hline 7575 \\ 946 \\ 132 \\ \hline 00 \\ 87\frac{1}{2} \\ 56\frac{3}{4} \end{array}$$

$$\text{Ans. } 8654 \ 43\frac{3}{4}$$

COMPOUND MULTIPLICATION.

$$(6) \quad \begin{array}{r} \$ \text{ cts.} \\ 25 \quad 43\frac{3}{4} \times 9 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 254 \quad 37\frac{1}{2} \times 7 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 2543 \quad 75 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 20350 \quad 00 \\ 1780 \quad 62 \\ 228 \quad 93\frac{3}{4} \\ \hline \end{array}$$

$$\text{Ans. } 22359 \quad 56\frac{1}{4}$$

$$(7) \quad \begin{array}{r} \$ \text{ cts.} \\ 0 \quad 1\frac{3}{4} \times 6 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 0 \quad 17\frac{1}{2} \times 6 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 1 \quad 75 \times 2 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 17 \quad 50 \\ 35 \quad 00 \\ 3 \quad 50 \\ 1 \quad 00 \\ \hline 10\frac{1}{2} \end{array}$$

$$\text{Ans. } 39 \quad 65\frac{1}{2}$$

$$(8) \quad \begin{array}{r} \$ \text{ cts.} \\ 10 \quad 16\frac{1}{4} \times 9 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 101 \quad 65 \times 3 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 1016 \quad 50 \\ \hline 9 \end{array}$$

$$\begin{array}{r} 9148 \quad 50 \\ 304 \quad 95 \\ 91 \quad 48\frac{1}{4} \\ \hline \end{array}$$

$$\text{Ans. } 9544 \quad 93\frac{1}{4}$$

$$(9) \quad \begin{array}{r} \$ \text{ s. d.} \\ 37 \quad 18 \quad 6\frac{1}{4} \times 5 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 379 \quad 5 \quad 2\frac{1}{2} \times 7 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 3792 \quad 12 \quad 1 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 11377 \quad 16 \quad 3 \\ 2654 \quad 16 \quad 5\frac{1}{4} \\ 189 \quad 12 \quad 7\frac{1}{4} \\ \hline \end{array}$$

$$\text{Ans. } 14222 \quad 5 \quad 3\frac{3}{4}$$

COMPOUND MULTIPLICATION.

35

$$(10) \begin{array}{r} \text{£.} \quad \text{s.} \quad \text{d.} \\ 48 \quad 14 \quad 2\frac{1}{2} \times 9 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 487 \quad 2 \quad 1 \times 8 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 4871 \quad 0 \quad 10 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 19484 \quad 3 \quad 4 \\ 3896 \quad 16 \quad 8 \\ 438 \quad 7 \quad 10\frac{1}{2} \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{23819 \quad 7 \quad 10\frac{1}{2}}}$$

$$(11) \begin{array}{r} \text{£.} \quad \text{s.} \quad \text{d.} \\ 64 \quad 2 \quad 8 \times 5 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 641 \quad 6 \quad 8 \times 5 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 6413 \quad 6 \quad 8 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 32066 \quad 13 \quad 4 \\ 3206 \quad 13 \quad 4 \\ 320 \quad 13 \quad 4 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{35594 \quad 0 \quad 0}}$$

$$(12) \begin{array}{r} \text{£.} \quad \text{s.} \quad \text{d.} \\ 58 \quad 9 \quad 6\frac{1}{4} \times 6 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 584 \quad 15 \quad 7\frac{1}{4} \times 9 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 5847 \quad 16 \quad 3 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 17543 \quad 8 \quad 9 \\ 5263 \quad 0 \quad 7\frac{1}{4} \\ 350 \quad 17 \quad 4\frac{1}{2} \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{23157 \quad 6 \quad 9}}$$

$$(13) \begin{array}{r} \text{M.} \quad \text{f.} \quad \text{p.} \\ 25 \quad 3 \quad 18 \times 5 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 254 \quad 2 \quad 20 \times 6 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 2543 \quad 1 \quad 0 \times 2 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 25431 \quad 2 \quad 0 \\ 5086 \quad 2 \quad 0 \\ 1525 \quad 7 \quad 0 \\ 127 \quad 1 \quad 10 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{32170 \quad 4 \quad 10}}$$

36

COMPOUND MULTIPLICATION.

	F. in.b.c.	Yd. gr.n.	Hhd. gal.qt.
(14)	48 4 2 × 7	22 2 1 × 4	437 2 by 4250
	10	10	10
	483 10 2 × 8	225 2 2	45 60 0 × 5
	10	10	10
	4838 10 2 × 5	2256 1 0 × 2	459 33 0 × 2
	10	10	10
	48388 10 2	22562 2 0	4595 15 0
	2	3	4
	96777 9 1	67687 2 0	18380 60 0
	24194 5 1	4512 2 0	919 3 0
	3871 1 1	90 1 0	229 48 0
	338 8 2		
	Ans. 125182 0 2	Ans. 72290 1 0	Ans. 19529 48 0

APPLICATION.

(1) \$12.50	(2) \$1.07	(3) \$5.62½	(4) \$1.12½
5	9	12	6
Ans. 62.50	Ans. 9.63	Ans. 67.50	6.75
4			
Ans. 27.00			

(5)	£ s. d.	£ cts.
	0 2 2 by 63	3 87½ by 64
	7	8
	0 15 2	31 00
	9	8
	Ans. 6 16 6	Ans. 248 00

COMPOUND MULTIPLICATION.

37

(7) \$ 0 15 $\frac{1}{4}$
10

1 524
10

**15 25
0 91½**

Ans. 16 16}

(8) £ s. d.
0 1 3
12

$$\begin{array}{r} \overline{0\ 15\ 0} \\ -11 \\ \hline \end{array}$$

Ans. 8 5 0

—

(9) \$ 9 cts.
10 x 5
10

91 0×6
10

**910 0
3**

2730 0
548 0
45 50

Ans. 3321 50

(10) £ s. d.
0 9 6 per acre x
10

$$\begin{array}{r} \overline{4 \ 15 \ 0 \times 2} \\ 10 \end{array}$$

47 10 0
3

142 10 0
9 10 0
2 7 6

Ans.154 7 6

(11) § 18 $\frac{3}{4}$ x 7
10

$$\begin{array}{r} \overline{11} \\ \times 87\frac{1}{2} \\ \hline 10 \end{array}$$

118 75
2

237 50

11 87
8 31

Ans. 257 68 $\frac{3}{4}$ prime cost

COMPOUND SUBTRACTION.

$$\text{Again: } \begin{array}{r} \$1\ 37\frac{1}{2} \times 7 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 13\ 75 \times 1 \\ \hline 10 \end{array}$$

$$\begin{array}{r} 137\ 50 \\ - 2 \\ \hline \end{array}$$

$$\begin{array}{r} 275\ 00 \\ - 13\ 75 \\ \hline 9\ 62\frac{1}{2} \end{array}$$

$$\begin{array}{r} \$298\ 37\frac{1}{2} \text{ sold for.} \\ - \$257\ 68\frac{3}{4} \text{ prime cost.} \\ \hline \end{array}$$

$$\begin{array}{r} \$40\ 68\frac{3}{4} \text{ gain.} \\ \hline \end{array}$$

•••••

COMPOUND SUBTRACTION.

EXAMPLES.

FEDERAL MONEY.

$$\begin{array}{r} \$ cts. m. \\ (2) \text{ From } 24\ 60\ 7 \\ \text{Take } 19\ 30\ 0 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{5\ 30\ 7}}$$

$$\begin{array}{r} \$ cts. \\ (3) 600\ 62\frac{1}{2} \\ - 1\ 75 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{598\ 87\frac{1}{2}}}$$

$$\begin{array}{r} \$ cts. \\ (4) 110\ 18\frac{3}{4} \\ - 99\ 10\frac{1}{4} \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{11\ 8\frac{1}{2}}}$$

$$\begin{array}{r} \$ cts. m. \\ (5) 960\ 10\ 2 \\ - 9 \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{960\ 09\ 3}}$$

$$\begin{array}{r} \$ cts. \\ (6) 449\ 62\frac{1}{2} \\ - 1\ 06\frac{3}{4} \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{448\ 55\frac{3}{4}}}$$

$$\begin{array}{r} \$ cts. \\ (7) 1866\ 00 \\ - 278\ 11\frac{3}{4} \\ \hline \end{array}$$

$$\text{Ans. } \underline{\underline{1587\ 88\frac{1}{4}}}$$

COMPOUND SUBTRACTION.

39

$$(8) \begin{array}{r} \$ \quad \text{ds.} \\ 104 \quad 06\frac{1}{4} \\ - 9\frac{3}{4} \\ \hline \text{Ans. } 103 \quad 96\frac{1}{4} \end{array}$$

$$(9) \begin{array}{r} \$ \quad \text{cls. m.} \\ 4010 \quad 14 \quad 4 \\ - 1011 \quad 12 \quad 5 \\ \hline \text{Ans. } 2999 \quad 1 \quad 9 \end{array}$$

$$(10) \begin{array}{r} \$ \quad \text{cls.} \\ 400 \quad 00 \\ - 211 \quad 12\frac{1}{2} \\ \hline \text{Ans. } 188 \quad 87\frac{1}{2} \end{array}$$

ENGLISH MONEY.

$$(2) \begin{array}{r} £ \quad s. \quad d. \\ 47 \quad 6 \quad 7\frac{1}{4} \\ - 28 \quad 5 \quad 10\frac{3}{4} \\ \hline \text{Ans. } 19 \quad 0 \quad 9\frac{1}{4} \end{array}$$

$$(3) \begin{array}{r} £ \quad s. \quad d. \\ 419 \quad 7 \quad 6 \\ - 227 \quad 8 \quad 9\frac{1}{4} \\ \hline \text{Ans. } 191 \quad 18 \quad 8\frac{3}{4} \end{array}$$

$$(4) \begin{array}{r} £ \quad s. \quad d. \\ 1000 \quad 11 \quad 11\frac{3}{4} \\ - 200 \quad 9 \quad 0 \\ \hline \text{Ans. } 800 \quad 2 \quad 11\frac{3}{4} \end{array}$$

$$(5) \begin{array}{r} £ \quad s. \quad d. \\ 1000 \quad 2 \quad 4\frac{1}{4} \\ - 60 \quad 7 \quad 8\frac{3}{4} \\ \hline \text{Ans. } 939 \quad 14 \quad 7\frac{1}{4} \end{array}$$

AVOIRDUPOIS WEIGHT.

$$(2) \begin{array}{r} T. cwt. qr. lb. oz. dr. \\ 18 \quad 16 \quad 1 \quad 16 \quad 9 \quad 2 \\ - 0 \quad 19 \quad 3 \quad 20 \quad 0 \quad 6 \\ \hline \text{Ans. } 17 \quad 16 \quad 1 \quad 24 \quad 8 \quad 12 \end{array}$$

$$(3) \begin{array}{r} cwt. qr. lb. oz. \\ 9 \quad 3 \quad 20 \quad 2 \\ - 2 \quad 23 \quad 5 \\ \hline \text{Ans. } 9 \quad 0 \quad 24 \quad 13 \end{array}$$

$$(4) \begin{array}{r} T. cwt. qr. lb. \\ 14 \quad 10 \quad 2 \quad 16 \\ - 0 \quad 0 \quad 0 \quad 11 \\ \hline \text{Ans. } 14 \quad 10 \quad 2 \quad 5 \end{array}$$

$$(5) \begin{array}{r} Cwt. qr. lb. \\ 400 \quad 0 \quad 0 \\ - 2 \quad 3 \quad 14 \\ \hline \text{Ans. } 397 \quad 0 \quad 14 \end{array}$$

TROY WEIGHT.

$$(2) \begin{array}{r} lb. oz. dwt. gr. \\ 8 \quad 3 \quad 0 \quad 2 \\ - 2 \quad 1 \quad 18 \quad 6 \\ \hline \text{Ans. } 6 \quad 1 \quad 1 \quad 20 \end{array}$$

$$(3) \begin{array}{r} lb. oz. dwt. gr. \\ 106 \quad 0 \quad 0 \quad 15 \\ - 10 \quad 6 \quad 2 \quad 20 \\ \hline \text{Ans. } 95 \quad 5 \quad 17 \quad 19 \end{array}$$

COMPOUND SUBTRACTION.

lb. oz. dwt. gr.

$$(4) \begin{array}{r} 22 \\ - 14 \\ \hline 8 \end{array} \begin{array}{r} 0 \\ 6 \\ \hline 11 \end{array} \begin{array}{r} 12 \\ 0 \\ \hline 0 \end{array}$$

$$\text{Ans. } \underline{\underline{7 \ 6 \ 1 \ 6}}$$

lb. oz. dwt. gr.

$$(5) \begin{array}{r} 16 \\ - 12 \\ \hline 4 \end{array} \begin{array}{r} 0 \\ 11 \\ \hline 10 \end{array} \begin{array}{r} 0 \\ 11 \\ \hline 11 \end{array}$$

$$\text{Ans. } \underline{\underline{3 \ 0 \ 9 \ 13}}$$

APOTHECARIES' WEIGHT.

$$\begin{array}{r} \text{lb. } 3 \\ (2) \begin{array}{r} 48 \\ - 1 \\ \hline 10 \end{array} \end{array} \begin{array}{r} 3 \\ 6 \\ 1 \\ 4 \\ \hline 2 \end{array}$$

$$\text{Ans. } \underline{\underline{46 \ 11 \ 5 \ 1 \ 16}}$$

$$\begin{array}{r} \text{lb. } 8 \\ (3) \begin{array}{r} 59 \\ - 53 \\ \hline 7 \end{array} \end{array} \begin{array}{r} 3 \\ 2 \\ \hline 5 \end{array}$$

$$\text{Ans. } \underline{\underline{5 \ 5 \ 5}}$$

$$\begin{array}{r} \text{lb. } 6 \\ (4) \begin{array}{r} 69 \\ - 14 \\ \hline 9 \end{array} \end{array} \begin{array}{r} 3 \\ 0 \\ 1 \\ 1 \\ \hline 1 \end{array}$$

$$\text{Ans. } \underline{\underline{54 \ 2 \ 7}}$$

CLOTH MEASURE.

$$\begin{array}{r} \text{yd. qr. na.} \\ (2) \begin{array}{r} 950 \\ - 19 \\ \hline 2 \end{array} \end{array} \begin{array}{r} 1 \\ 2 \\ 3 \end{array}$$

$$\text{Ans. } \underline{\underline{930 \ 2 \ 3}}$$

$$\begin{array}{r} \text{yd. qr. na.} \\ (3) \begin{array}{r} 49 \\ - 16 \\ \hline 2 \end{array} \end{array} \begin{array}{r} 0 \\ 2 \\ 1 \end{array}$$

$$\text{Ans. } \underline{\underline{32 \ 2 \ 1}}$$

$$\begin{array}{r} \text{E.E. qr. na.} \\ (4) \begin{array}{r} 66 \\ - 17 \\ \hline 6 \end{array} \end{array} \begin{array}{r} 4 \\ 0 \\ 2 \\ \hline 1 \end{array}$$

$$\text{Ans. } \underline{\underline{49 \ 3 \ 2}}$$

$$\begin{array}{r} \text{E.Fr. qr.} \\ (5) \begin{array}{r} 44 \\ - 19 \\ \hline 2 \end{array} \end{array} \begin{array}{r} 1 \\ 2 \\ 2 \end{array}$$

$$\text{Ans. } \underline{\underline{24 \ 4}}$$

$$\begin{array}{r} \text{E.FL. qr.} \\ (6) \begin{array}{r} 963 \\ - 174 \\ \hline 1 \end{array} \end{array} \begin{array}{r} 1 \\ 2 \\ 3 \end{array}$$

$$\text{Ans. } \underline{\underline{788 \ 2}}$$

$$\begin{array}{r} \text{Yd. qr. na.} \\ (7) \begin{array}{r} \text{Bought} \\ \text{Damaged} \end{array} \end{array} \begin{array}{r} 17 \\ 2 \\ 0 \\ 2 \\ 3 \\ 1 \end{array}$$

$$\text{Ans. } \underline{\underline{14 \ 2 \ 3}}$$

$$\begin{array}{r} \text{Yd. qr. na.} \\ (8) \begin{array}{r} 75 \\ 0 \\ 0 \\ 1 \end{array} \end{array} \begin{array}{r} 3 \\ 1 \\ 0 \\ 1 \end{array}$$

$$\text{Ans. } \underline{\underline{75 \ 3 \ 0}}$$

LONG MEASURE.

$$\begin{array}{r} \text{Deg. m. fur. p.} \\ (2) \begin{array}{r} 20 \\ 11 \\ \hline 56 \end{array} \end{array} \begin{array}{r} 50 \\ 56 \\ 0 \\ 30 \end{array}$$

$$\text{Ans. } \underline{\underline{8 \ 54 \ 3 \ 30}}$$

$$\begin{array}{r} \text{M. fur. p.} \\ (3) \begin{array}{r} \text{Travels first day} \\ \text{second do.} \end{array} \end{array} \begin{array}{r} 43 \\ 32 \\ 5 \\ 00 \end{array}$$

$$\begin{array}{r} \text{Ans. } 11 \\ \hline 1 \end{array} \begin{array}{r} 20 \\ 4 \\ 00 \end{array}$$

$$\text{Ans. } \underline{\underline{1 \ 20 \ \text{more.}}}$$

LAND MEASURE.

$$\begin{array}{r} \text{A. R. P.} \\ (2) \begin{array}{r} 502 \\ 111 \\ \hline 3 \end{array} \end{array} \begin{array}{r} 2 \\ 3 \\ 9 \end{array}$$

$$\text{Ans. } \underline{\underline{390 \ 3 \ 1}}$$

$$\begin{array}{r} \text{A. R. P.} \\ (3) \begin{array}{r} 69 \\ 17 \\ \hline 3 \end{array} \end{array} \begin{array}{r} 1 \\ 3 \\ 2 \end{array}$$

$$\text{Ans. } \underline{\underline{51 \ 2 \ 1}}$$

COMPOUND SUBTRACTION.

41

LIQUID MEASURE.

	<i>T. hhd. gal. qt. pt.</i>	<i>Hhd. gal.</i>
(2)	100 1 19 2 1	(3) 2 0
	99 1 28 3 1	0 29
Ans.	3 53 3 0	Ans. 1 34

(4) From 1 pipe of wine, which is 126 gals., subtract 93, leaves 33 gals. of wine. Then from 4 hhds. of brandy, subtract 29 gals., leaves 223 of brandy. Then from 2 bbls. of beer, subtract 1, leaves 1 barrel, which is $31\frac{1}{2}$ gals.

Answer, 33 gals. wine, 223 gals. brandy, $31\frac{1}{2}$ gals. beer.

DRY MEASURE.

	<i>B. p. qt. pt.</i>	<i>B. p. qt. pt.</i>	<i>B. p. qt. pt.</i>
(2)	10 0 0 1	(3) 695 3 0 1	(5) 600 2 7 1
	9 2 6 1	589 3 5 0	146 3 2 1
Ans.	1 2 0	Ans. 105 3 3 1	Ans. 453 3 5 0

TIME.

	<i>H. min. sec.</i>	<i>Y. m. w.</i>
(2)	16 29 33	(3) 18 11 2
	7 36 44	9 10 3
Ans.	8 52 49	Ans. 9 0 3
	<i>Y. m. w. d.</i>	<i>Y. m. w. d. h.</i>
(4)	900 0 0 0 0	(5) 6 0 0 0 0 0
	111 6 2 6	1 1 1 1 1
Ans.	788 5 1 1	Ans. 4 10 2 5 23

MOTION, OR CIRCLE MEASURE.

	<i>sig. ° ' "</i>	<i>sig. ° ' "</i>	<i>sig. ° ' "</i>
(2)	9 7 40 8	(3) 10 10 16 12	(4) 11 2 5 14
	7 9 57 19	7 24 37 59	9 0 7 20
Ans.	1 27 42 49	Ans. 2 15 38 13	Ans. 2 1 57 54

COMPOUND SUBTRACTION.

APPLICATION.

(1) 6 feet of chain at \$2.75	
per foot	= \$16.50
A gold ring for	4.50
Ear-rings	12.00
	<hr/>
	\$33.00 whole amount.
Ring	4.50 has been returned
To receive	<u>\$28.50</u>

(2)	2 doz. pairs at 75 cts.	=	\$ cts.
	16 yds. at 87½ —	=	18.00
	28 do. at 22 —	=	14.00
	5 pair at 31¼ —	=	6.16
		=	1.56¼
	<hr/>		<hr/>
	Amount	39	72¼
	Note delivered	50	00
	<hr/>		<hr/>
	Must be returned	10	27¾
	<hr/>		<hr/>

(3)	A. R. P.	(4)	£ s.
1st tract contains	690 2 16	(4)	55 6
2d do. do.	400 0 0		41 4
3d do. do.	63 3 24		75 0
4th do. do.	63 3 24	<hr/>	<hr/>
In the whole	1218 1 24	Collected	171 11
Sold	200 0 00	Lost	40 6
<hr/>	<hr/>	I have	131 5
Remains	1018 1 24	<hr/>	<hr/>
<hr/>	<hr/>		

(5)	Bu. p.	Bu. p.	Bu. p.
Bought 400 3 of wheat,	160 0 of rye,	150 2 of oats	
Sold 225 1 do.	37 2 do.	78 3 do.	
Remaining 175 2	122 2	71 3	

COMPOUND DIVISION.

EXAMPLES.

$$(3) \begin{array}{r} \$ cts. \\ 3) 366 \ 18\frac{3}{4} \\ \hline \text{Ans. } 122 \ 6\frac{1}{4} \end{array} \quad (4) \begin{array}{r} \$ cts. \\ 6) 384 \ 87\frac{1}{2} \\ \hline \text{Ans. } 64 \ 14\frac{1}{2} + 2 \end{array} \quad (5) \begin{array}{r} \$ cts. \\ 8) 496 \ 75 \\ \hline \text{Ans. } 62 \ 09\frac{1}{4} + 4 \end{array}$$

$$(6) \begin{array}{r} \$ cts. \\ 9) 587 \ 68\frac{3}{4} \\ \hline \text{Ans. } 65 \ 29\frac{3}{4} + 4 \end{array} \quad (7) \begin{array}{r} \$ cts. \\ 11) 976 \ 43\frac{3}{4} \\ \hline \text{Ans. } 88 \ 76\frac{1}{4} + 9 \end{array} \quad (8) \begin{array}{r} \$ cts. \\ 12) 1979 \ 33\frac{3}{4} \\ \hline \text{Ans. } 164 \ 94\frac{1}{4} + 4 \end{array}$$

$$(9) \begin{array}{r} £ s. d. \\ 3) 560 \ 9 \ 7 \\ \hline \text{Ans. } 186 \ 16 \ 6\frac{1}{4} + 1 \end{array} \quad (10) \begin{array}{r} £ s. d. \\ 5) 475 \ 19 \ 9\frac{3}{4} \\ \hline \text{Ans. } 95 \ 3 \ 11\frac{1}{4} + 1 \end{array}$$

$$(11) \begin{array}{r} £ s. d. \\ 8) 596 \ 15 \ 6\frac{1}{4} \\ \hline \text{Ans. } 74 \ 11 \ 11\frac{1}{4} + 2 \end{array} \quad (12) \begin{array}{r} £ s. d. \\ 12) 756 \ 4 \ 11\frac{3}{4} \\ \hline \text{Ans. } 63 \ 0 \ 4\frac{3}{4} + 11 \end{array}$$

$$(13) \begin{array}{r} Cwt. qr. lb. \\ 5) 45 \ 3 \ 27 \end{array} \quad (14) \begin{array}{r} Cwt. qr. lb. \\ 9) 10 \ 0 \ 15 \end{array} \quad (15) \begin{array}{r} Yds. qr. na. \\ 7) 44 \ 1 \ 2 \end{array}$$

$$\text{Ans. } 9 \ 0 \ 22 + 1 \quad \text{Ans. } 1 \ 0 \ 14 + 1 \quad \text{Ans. } 6 \ 1 \ 1 + 3$$

$$(16) \begin{array}{r} Yds. qr. na. \\ 11) 56 \ 3 \ 3 \end{array} \quad (17) \begin{array}{r} M. fur. p. \\ 12) 105 \ 5 \ 22 \end{array} \quad (18) \begin{array}{r} M. fur. p. \\ 6) 45 \ 7 \ 18 \end{array}$$

$$\text{Ans. } 5 \ 0 \ 2 + 9 \quad \text{Ans. } 8 \ 6 \ 18 + 6 \quad \text{Ans. } 7 \ 5 \ 9 + 4$$

When the divisor exceeds 12, but is the exact product of any two figures in the multiplication table.

$$(19) \begin{array}{r} \$ cts. m. \\ 6) 45 \ 66 \ 5 \\ \hline 6) 7 \ 61 \ 0 + 5 \end{array} \quad (20) \begin{array}{r} \$ cts. m. \\ 4) 98 \ 77 \ 8 \\ \hline \text{Rem. } 11) 24 \ 69 \ 4 + 2 \end{array}$$

$$\text{Ans. } 1 \ 26 \ 8 + 2 \times 6 + 5 = 17 \quad \text{Ans. } 2 \ 24 \ 4 + 10 \times 4 + 2 = 42 \quad \text{Rem. }$$

COMPOUND DIVISION.

$$(21) \begin{array}{r} \$ cts. m. \\ 12) 77\ 87\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 8) 6\ 48\ 9+7 \\ \hline \end{array}$$

$$\text{Ans. } \underline{0\ 81\ 1+1\times 12+7=19} \quad \text{Ans. } \underline{2\ 67\frac{1}{4}+1\times 12+11=}$$

$$(22) \begin{array}{r} \$ cts. \\ 12) 288\ 68\frac{3}{4} \\ \hline \end{array}$$

$$9) 24\ 05\frac{1}{2}+11$$

Rem.

R

COMPOUND DIVISION.

45

When the divisor exceeds 12, and is not the product of any two figures in the multiplication table.

$$(31) \begin{array}{r} \$ cts. \\ 78) 196 \end{array} \begin{array}{r} \$ cts. m. \\ 75(2 \ 52 \ 2 \text{ Ans.} \end{array} \quad (32) \begin{array}{r} \$ cts. \\ 97) 496 \end{array} \begin{array}{r} \$ cts. m. \\ 87(5 \ 12 \ 2 \end{array}$$

$$\begin{array}{r} 156 \\ \hline 78) 4075(52 \text{ cts.} \\ 3900 \\ \hline 175 \end{array} \quad \begin{array}{r} 97) 1187(12 \text{ cts.} \\ 97 \\ \hline \end{array}$$

$$\begin{array}{r} 156 \\ \hline 78) 190(2 \text{ mills.} \\ 156 \\ \hline 23 \end{array} \quad \begin{array}{r} 217 \\ 194 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Rem. } 34 \\ \hline \end{array} \quad \begin{array}{r} 97) 235(2 \text{ mills.} \\ 194 \\ \hline \end{array}$$

41 Rem.

$$(38) \begin{array}{r} \$ cts. \\ 123) 376 \end{array} \begin{array}{r} \$ cts. \\ 81\frac{1}{4}(3 \ 08\} \end{array} \quad \begin{array}{r} £ s. d. \\ 87) 44 \end{array} \begin{array}{r} £ s. d. \\ 7 \ 6(0 \ 10 \ 2\frac{1}{4} \text{ Ans.} \end{array}$$

$$\begin{array}{r} 369 \\ \hline 123) 781(6 \text{ cts.} \\ 738 \\ \hline 43 \end{array} \quad \begin{array}{r} 20 \\ 87) 887(10 \text{ shillings.} \\ 87 \\ \hline 17 \end{array}$$

$$\begin{array}{r} 4 \\ \hline 123) 173(1 \\ 123 \\ \hline 50 \text{ Rem.} \end{array} \quad \begin{array}{r} 12 \\ 87) 210(2 \text{ pence.} \\ 174 \\ \hline 36 \end{array}$$

$$87) 144(1 \text{ farthing.}$$

$$\begin{array}{r} 87 \\ \hline 57 \text{ Rem.} \end{array}$$

COMPOUND DIVISION.

$$(35) \quad \begin{array}{r} \text{£} \quad s. \quad d. \\ 148)156 \quad 15 \quad 8\frac{3}{4} \\ \hline 148 \end{array} \quad (1 \quad 1 \quad 2\frac{1}{4} \text{ nearly, Ans.}$$

8
20

$$148)175(1 \text{ shilling.}$$

148
27
13

$$148)332(2 \text{ pence.}$$

296
36
4
147
148

PRACTICAL EXAMPLES.

$$(1) \quad \begin{array}{r} \text{£ cts. m.} \\ 6)47 \ 87 \ 5 \\ \hline \end{array}$$

4)7 97 9+1

$$\text{Ans. } 1 \ 99 \ 4 + 3 \times 6 + 1 = 19 \text{ Rem. } 560$$

$$(2) \quad \begin{array}{r} \text{£ cts. } \text{£ cts.} \\ 112)64 \ 81\frac{1}{4}(0 \ 57\frac{3}{4} \text{ Ans.} \\ \hline 100 \end{array}$$

$$112)6481(57 \text{ cts.}$$

881
784
97
4

$$112)389(3$$

388
53 Rem.

COMPOUND DIVISION

47

$\frac{\$}{cts.}$	$\frac{\$}{cts. m.}$	$\frac{\$}{cts.}$	$\frac{\$}{cts. m.}$
(3) 72) 56 25(0 78 1 Ans.		(4) 63) 125 00(1 98 4 Ans.	
100		63	
<u>72)</u> 5625 78 cts.		<u>63)</u> 6200(98 cts.	
504		567	
<u> </u> 585		<u> </u> 530	
576		504	
<u> </u> 9		<u> </u> 26	
10		10	
<u>72)</u> 90(1 mill.		<u>63)</u> 260(4 mills.	
72		252	
18 Rem.		8 Rem.	

$\frac{\$}{cts. s. d.}$	$\frac{\$}{cts. s. d.}$	$\frac{\$}{cts. s. d.}$	$\frac{\$}{cts. s. d.}$
(5) 4) 18 17 6	(7) 1000) 576 18 9 $\frac{1}{2}$ 0 11 4 $\frac{1}{4}$ Ans.		
Ans. <u>4, 14 4</u> $\frac{1}{2}$		20	
	1000) 11358(11 shillings.		
	1000		
(6) 125) 1875 81 $\frac{1}{4}$ (15 00 $\frac{1}{4}$ Ans.		1358	
125		1000	
<u> </u> 625		358	
625		12	
<u>125)</u> 00081(00 cts.		1000) 4305(4 pence.	
4		4000	
<u>125)</u> 325(2 qrs.		305	
250		4	
75 Rem.		1000) 1222(1 farthing.	
		1000	
		222 Rem.	

REDUCTION.

<i>Gal. qt. pt. G. qt. pt.</i>	<i>C. qr. lb. C. qr. lb.</i>
(8) 89)150 2 1(1 2 1 Ans.	(9) 19)9 1 25(0 1 27 A
89	4
—	—
61	19)37(1 qr.
4	19
—	—
89)246(2 quarts.	18
178	28
—	—
68	149
2	38
—	—
89)137(1 pint.	19)529(27 lbs.
89	38
—	—
48 Rem.	149
—	133
—	—
16 Rem.	—

REDUCTION.

FEDERAL MONEY.

EXAMPLES.

(1)	\$ 10 100	(2)	\$ 25 100	(3)	\$ 387 100	(4)	cts. 25 4
Ans.	1000	Ans.	2500	Ans.	38700	Ans.	100 four

REDUCTION.

49

$$(5) \begin{array}{r} cts. \\ 50 \\ 2 \\ \hline \end{array}$$

$$(6) \begin{array}{r} cts. \\ 150 \\ 3 \\ \hline \end{array}$$

$$(7) \begin{array}{r} \$ \\ 50 \\ 100 \\ \hline \end{array}$$

Ans. 100 halves.

Ans. 450 thirds.

 $\frac{5000}{2}$

$$(8) \begin{array}{r} \$ \\ 25 \\ 100 \\ \hline \end{array}$$

$$(9) \begin{array}{r} \$ \\ 275 \\ 100 \\ \hline \end{array}$$

Ans. $\frac{10000}{2}$ halves.

$$\begin{array}{r} 2500 \\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 27500 \\ 4 \\ \hline \end{array}$$

$$(10) \begin{array}{r} \$ \\ 10 \\ 10 \\ \hline \end{array}$$

Ans. 7500 thirds.

Ans. $\frac{110000}{2}$ qrs.

Ans. 100 dimes.

$$(11) \begin{array}{r} \$ \\ 220 \\ 10 \\ \hline \end{array}$$

 $\frac{2200}{10}$ dimes. $\frac{22000}{10}$ cts.Ans. $\frac{220000}{2}$ mills.

Note.—When more than one denomination is given to be reduced.

$$(1) \begin{array}{r} \$ cts. \\ 15 15 \\ 100 \\ \hline \end{array}$$

$$(2) \begin{array}{r} \$ cts. \\ 2 25 \\ 100 \\ \hline \end{array}$$

$$(3) \begin{array}{r} \$ cts. \\ 17 18\frac{3}{4} \\ 100 \\ \hline \end{array}$$

Ans. $\frac{1515}{2}$ cts.Ans. $\frac{225}{4}$ cts.Ans. $\frac{1718\frac{3}{4}}{4}$ cts.Ans. $\frac{900}{4}$ 4ths.Ans. $\frac{6875}{4}$ 4ths.

REDUCTION.

$$(4) \begin{array}{r} \text{£ cts.} \\ 13 27\frac{1}{2} \\ \hline 100 \\ \hline 1327 \\ \hline 3 \end{array}$$

Ans. 3982 thirds.

$$(5) \begin{array}{r} \text{£ cts.} \\ 426 88\frac{1}{2} \\ \hline 100 \\ \hline 42688 \\ \hline 2 \end{array}$$

Ans. 86377 halves.

ENGLISH MONEY.

$$\begin{array}{lllll} (2) & \text{£} & (3) & \text{s.} & (4) \quad \text{s.} \\ & 364 & (3) & 20 & 70 \\ & \hline & 20 & \hline & 12 \\ & & & & 12 \\ \hline \text{Ans. } & 7280 & \text{s.} & \text{Ans. } & 240 & \text{d.} \\ & & \hline & & & \hline & & & & & \text{d.} \\ & & & (5) & 12 & 4 \\ & & & & \hline & & & & 4 \\ & & & & & \hline & & & & & \text{Ans. } 48 & \text{qrs.} \end{array}$$

$$\begin{array}{lllll} (6) & \text{d.} & (8) & \text{£ s. d.} & (9) \quad \text{£ s. d.} \\ & 26 & (8) & 18 12 7 & (9) 105 13 9\frac{1}{2} \\ & \hline & 4 & \hline & 20 \\ & & & & 20 \\ \hline \text{Ans. } & 104 & \text{qrs.} & \text{Ans. } & 372 \\ & & \hline & & 12 \\ & & & & \hline & & & & 2113 \\ & & & & \hline & & & & 12 \\ & & & & \hline & & & & 739 \\ & & & & \hline & & & & 12 \\ & & & & \hline & & & & \text{Ans. } 4471 & \text{d.} \\ & & & & \hline & & & & 25365 \\ & & & & \hline & & & & 4 \\ & & & & \hline & & & & \text{Ans. } 101462 \\ & & & & \hline & & & & \text{Ans. } 35503 & \text{qrs} \end{array}$$

Cents to Pence.

$$\begin{array}{r} \text{cts.} \\ (2) \quad 36975 \\ \hline 9 \\ \hline 10) 332775 \\ \hline \text{Ans. } 33277\frac{1}{4} \text{ d.} \end{array}$$

$$\begin{array}{r} \text{cts.} \\ (3) \quad 57697 \\ \hline 9 \\ \hline 10) 519273 \\ \hline \text{Ans. } 51927\frac{1}{4} + \text{d.} \end{array}$$

REDUCTION.

51

Pence to Cents.

	<i>d.</i>		<i>d.</i>
(2)	4590		76975
	10		10
	<u>9) 45900</u>		<u>9) 769750</u>

Ans. 5100 cts.Ans. 65527 cts. 7 m. + 7

AVOIRDUPOIS WEIGHT.

	<i>Cwt.</i>	<i>qr.</i>	<i>lb.</i>	<i>oz.</i>
(2)	260	36	17	20
	4	28	16	16
	<u>Ans. 1040 qrs.</u>	<u>288</u>	<u>102</u>	<u>120</u>
		72	17	20
		<u>Ans. 1008 lbs.</u>	<u>Ans. 272 oz.</u>	<u>Ans. 320 dr.</u>

	<i>T. cwt. qr.</i>		<i>Qr. lb. oz.</i>
(6)	5 12 2		2 25 10
	20		28
	<u>112</u>		<u>21</u>
	4		6
	<u>Ans. 450 qrs.</u>		<u>81 lbs.</u>

16

486

82

1306 ounces.

16

7836

1306

Ans. 20896 drams.

REDUCTION.

APOTHECARIES' WEIGHT.

(2) <u>3</u> 72 8	(3) <u>lb</u> 10 12	(4) <u>lb</u> 15 12
-------------------------	---------------------------	---------------------------

$$\text{Ans. } \underline{576} \text{ drams. } \quad \underline{120} \text{ ozs. } \quad \underline{189} \text{ oz.}$$

$$\underline{\underline{8}} \quad \underline{\underline{8}}$$

$$960 \text{ drs. } \quad 1516 \text{ drs.}$$

$$\underline{\underline{3}} \quad \underline{\underline{3}}$$

$$2880 \text{ scr. } \quad 4550 \text{ scr.}$$

$$\underline{\underline{20}} \quad \underline{\underline{20}}$$

$$\text{Ans. } \underline{5760} \text{ grs. } \text{Ans. } \underline{91017} \text{ grs.}$$

CLOTH MEASURE.

(5) <u>Yds.</u> 36 4	(3) <u>E. E.</u> 20 5	(4) <u>E. Fl.</u> 16 3
----------------------------	-----------------------------	------------------------------

$$\text{Ans. } \underline{144} \text{ qrs. } \quad \text{Ans. } \underline{100} \text{ qrs. } \quad \underline{\underline{48}} \text{ qrs.}$$

$$\frac{4}{4}$$

$$\text{Ans. } \underline{192} \text{ na.}$$

$$\underline{\underline{—}}$$

(5) <u>E. Fl. qrs.</u> 5 3	(6) <u>E. Fr. qr.</u> 37 5	(7) <u>Yds. qrs.</u> 19 4
----------------------------------	----------------------------------	---------------------------------

$$\text{Ans. } \underline{17} \text{ qrs. } \quad \text{Ans. } \underline{187} \text{ qrs. } \quad \underline{\underline{78}} \text{ qrs.}$$

$$\frac{4}{4}$$

$$\text{Ans. } \underline{313} \text{ na.}$$

$$\underline{\underline{—}}$$

REDUCTION.

53

DRY MEASURE.

$$(2) \begin{array}{r} Pe. \\ 32 \\ 8 \end{array}$$

$$\text{Ans. } \underline{256 \text{ qts.}}$$

$$(3) \begin{array}{r} Bu. \\ 7 \\ 4 \end{array}$$

$$\text{Ans. } \underline{28 \text{ pe.}}$$

$$(4) \begin{array}{r} Bu. \\ 12 \\ 4 \end{array}$$

$$\begin{array}{r} 48 \\ 8 \\ \hline 384 \\ 2 \end{array}$$

$$\text{Ans. } \underline{768 \text{ pts.}}$$

$$(5) \begin{array}{r} Bu. pe. qt. \\ 14 0 3 \\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 56 \\ 8 \\ \hline \end{array}$$

$$\text{Ans. } \underline{451 \text{ qts.}}$$

$$(6) \begin{array}{r} Bu. pe. qt. pt. \\ 24 1 2 1 \\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 97 \\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} 778 \\ 2 \\ \hline \end{array}$$

$$\text{Ans. } \underline{1557 \text{ pts.}}$$

LAND MEASURE.

$$(2) \begin{array}{r} A. \\ 132 \\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 528 \\ 40 \\ \hline \end{array}$$

$$\text{Ans. } \underline{21120 \text{ p.}}$$

$$(3) \begin{array}{r} A. R. P. \\ 54 3 23 \\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 219 \\ 40 \\ \hline \end{array}$$

$$\text{Ans. } \underline{8783}$$

REDUCTION.

SQUARE MEASURE.

$$(2) \begin{array}{r} \text{Sq. yds.} \\ 120 \\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 1080 \\ 144 \\ \hline 4320 \\ 4320 \\ 1080 \\ \hline \end{array}$$

Ans. 155520 sq. in.

$$(3) \begin{array}{r} \text{Sq. yds. s.f. s.m.} \\ 29 \\ 2 \\ 102 \\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 263 \\ 144 \\ \hline 1154 \\ 1052 \\ 263 \\ \hline \end{array}$$

Ans. 37974 sq. in.

LIQUID MEASURE.

$$(2) \begin{array}{r} \text{Gals.} \\ 28 \\ 4 \\ \hline \end{array}$$

$$(3) \begin{array}{r} \text{Hhds.} \\ 5 \\ 63 \\ \hline \end{array}$$

Ans. 112 qts. Ans. 315 gals.

$$(4) \begin{array}{r} \text{Gals.} \\ 110 \\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 440 \\ 2 \\ \hline \end{array}$$

Ans. 880 pts. Ans. 72
144

$$(6) \begin{array}{r} \text{Hhds. gals. qts.} \\ 7 \\ 41 \\ 2 \\ 63 \\ \hline \end{array}$$

$$(7) \begin{array}{r} \text{Gals. qts.} \\ 47 \\ 2 \\ 4 \\ \hline \end{array}$$

Ans. 380' pts. Ans. 12096 pts.
6048 2

Ans. 1930 qts.

REDUCTION.

55

(8)	Hds. gals. qts.	(9)	Tuns hds. gals.	(10)	Tuns. hds. gal. qt. pt.
	4 0 3		19 0 27		5 1 15 1 1
	63		4		4

252	76 hds.	21
4	63	63

1011	255	78
2	456	126

Ans. 2022 pts.	4815	1338
	4	4

Ans. 19260 qts.	5353
	2

Ans. 10707 pts.

LONG MEASURE.

(2)	Yds.	(3)	Po.	(4)	Fur.	(5)	Miles.
	48		27		18		34
	3		$5\frac{1}{2}$		40		8

Ans. <u>144 ft.</u>	135	Ans. <u>720 po.</u>	Ans. <u>272 fur.</u>
	$13\frac{1}{2}$		

Ans. 148 $\frac{1}{2}$ yds.

(6)	L.	(7)	M.	(8)	M.
	108		17		20
	3		320 p.=1 m.		1760 yds.=1 m.

Ans. <u>324 m.</u>	340	Ans. <u>35200 yds.</u>
	51	

Ans. 5440 po.

REDUCTION.

$$(9) \begin{array}{r} L. \\ 6 \\ 3 \\ \hline 18 \\ 8 \\ \hline \end{array}$$

$$(10) \begin{array}{r} Ft. in. \\ 14 9 \\ 12 \\ \hline \end{array}$$

$$(11) \begin{array}{r} Yds. ft. \\ 37 1 \\ 3 \\ \hline \end{array}$$

Ans. 177 in. Ans. 112 ft.

$$\begin{array}{r} Fur. po. \\ 144 \\ 40 \\ \hline \end{array} \quad (12) \begin{array}{r} 112 29 \\ 40 \\ \hline \end{array}$$

$$\begin{array}{r} 5760 \\ 5\frac{1}{2} \\ \hline \end{array} \quad \begin{array}{r} 4509 \\ 5\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 28800 \\ 2880 \\ \hline \end{array} \quad \begin{array}{r} 22545 \\ 2254\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 31680 \\ 3 \\ \hline \end{array} \quad \text{Ans. } \underline{24799\frac{1}{2}} \text{ yds.}$$

$$\begin{array}{r} 95040 \\ 12 \\ \hline \end{array} \quad (14) \begin{array}{r} L. m. fur. po. yds. ft. in. \\ 2 1 3 16 3 2 10 \\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } \underline{1140480 in.} \\ \hline \end{array} \quad \begin{array}{r} 7 \\ 8 \\ \hline \end{array}$$

$$(13) \begin{array}{r} M. fur. po. \\ 450 6 32 \\ 8 \\ \hline \end{array} \quad \begin{array}{r} 59 \\ 40 \\ \hline \end{array}$$

$$\begin{array}{r} 3606 \\ 40 \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{2})2376 \\ 5\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } \underline{144272 po.} \\ \hline \end{array} \quad \begin{array}{r} 11883 \\ 1188 \\ \hline \end{array}$$

$$\begin{array}{r} 13071 \\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} 39215 \\ 12 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } \underline{470590 in.} \\ \hline \end{array}$$

TROY WEIGHT.

<i>oz.</i>	<i>lb.</i>	<i>oz. dwt.</i>	<i>lb. oz. dwt. gr.</i>
(2) 116	(3) 25	(4) 29 16	(5) 19 11 14 21
20	12	20	12
Ans. 2320 dwt.	300	Ans. 596 dwt.	239
—	20	—	20
6000			4794
24			24
24000			19197
12000			9588
Ans. 144000 gr.		Ans. 115077 gr.	—

TIME.

<i>Min.</i>	<i>hrs.</i>	<i>yrs.</i>
(1) 30	(2) 12	(3) 12
60	60	12
Ans. 1800 s.	Ans. 720 m.	Ans. 144 m.
—	—	—

<i>d. hr. min.</i>
(4) 3 5 29
24
—
17
6
—
77
60
—
Ans. 4649 min.
—

REDUCTION.

MOTION, OR CIRCLE MEASURE.

	Sig.	Sig. °	Sig. °
(1)	24	(2) 4	(3) 11 12
	60	30	30
Ans. 1440'	120	Ans. 342	123
	60		60
	7200		7398
	60		60
Ans. 432000			Ans. 443907"

PROMISCUOUS EXAMPLES.

	\$	Fur.	Days.	H. cts.
(1)	35	(2) 8 98	(3) 7 365	(4) 2 84
	100			
Ans. 3500 cts.	—	Ans. 12 m. 2 fur. Ans. 52 w. 1 d. Ans. 42 cts.	—	—

	Tuns cwt.	R.	S.	P.
(5)	8 15	(6) 63	(7) 2 0 15 7	(8) 4 175
	20	40		
Ans. 175 cwt.	—	Ans. £7 17 s.	Ans. 43 bu. 3 pe.	—

	cts.	Pts.	Sec.	Hhd.gal.
(9)	100)76 42	(10) 2)103	(11) 8 0)72 0	(12) 7 33
				63
Ans. £76 42 cts	—	Ans. 51 pts. 1 pt.	Ans. 12 min.	—
				24
				45
				Ans. 474 gal.

REDUCTION.

59

(13) $\underline{5|100}$

(14) $\underline{2|0|10|8}$

(15) $\underline{2|0|25|0}$

Ans. 20 E. E.

Ans. 5 oz. 8 dwt.

Ans. £12 10s.

(16) $\begin{array}{r} 3 \\ 7 \\ \hline 3 \end{array}$

(17) $\begin{array}{r} s. d. \\ 8 8 \\ \hline 12 \end{array}$

(18) $\underline{7|203}$

(19) $\begin{array}{r} Days. \\ 16 \\ \hline 4 \end{array}$

Ans. 21 D.

Ans. 104 d.

Ans. 29 w.

Ans. 64 na.

(20) $\begin{array}{r} drs. \\ 16|74|4 \\ \hline 64 \end{array}$

(21) $\begin{array}{r} S. \\ 13 \\ \hline 4 \end{array}$

(22) $\begin{array}{r} Tuns. \\ 20 \\ \hline 20 \end{array}$

(23) $\begin{array}{r} Qrs. \\ 5|81 \\ \hline \end{array}$

(24) $\begin{array}{r} Gal. qt. pt. \\ 21 3 1 \\ \hline 4 \end{array}$

(25) $\begin{array}{r} M.fur. \\ 3 1 \\ \hline 8 \end{array}$

Ans. 16 E. Fr. 1 qr.

Ans. 3 pence 52

Ans. 400 cwt.

(26) $\begin{array}{r} Cts. \\ 1|00|12|35 \\ \hline \end{array}$

(27) $\begin{array}{r} Days. \\ 3 \\ \hline 24 \end{array}$

(28) $\begin{array}{r} Cts. \\ 121 \\ \hline 4 \end{array}$

Ans. 312 35 cts.

Ans. 25 fur.

Ans. 175 pts.

(26) $\underline{1|00|12|35}$

(27) $\underline{3|24}$

(28) $\underline{121|4}$

Ans. 312 35 cts.

Ans. 25 fur.

Ans. 175 pts.

(26) $\underline{1|00|12|35}$

(27) $\underline{3|24}$

(28) $\underline{121|4}$

Ans. 312 35 cts.

Ans. 25 fur.

Ans. 175 pts.

(26) $\begin{array}{r} Cts. \\ 121 \\ \hline 4 \end{array}$

(27) $\begin{array}{r} Days. \\ 3 \\ \hline 72 \end{array}$

(28) $\begin{array}{r} Cts. \\ 484 \\ \hline 484 \end{array}$

Ans. 312 35 cts.

Ans. 25 fur.

Ans. 175 pts.

(26) $\begin{array}{r} Cts. \\ 121 \\ \hline 4 \end{array}$

(27) $\begin{array}{r} Days. \\ 3 \\ \hline 72 \end{array}$

(28) $\begin{array}{r} Cts. \\ 484 \\ \hline 484 \end{array}$

Ans. 312 35 cts.

Ans. 25 fur.

Ans. 175 pts.

(26) $\begin{array}{r} Cts. \\ 121 \\ \hline 4 \end{array}$

(27) $\begin{array}{r} Days. \\ 3 \\ \hline 72 \end{array}$

(28) $\begin{array}{r} Cts. \\ 484 \\ \hline 484 \end{array}$

Ans. 312 35 cts.

Ans. 25 fur.

Ans. 175 pts.

REDUCTION.

	<i>lbs.</i>	<i>Qrs.</i>	<i>Dwts.</i>
(29)	13	(30) 3)154	(31) 2 0)246 1
	16		
—	Ans. 51 E. Fl. 1 qr. 12)123+1 dwt.		
	78		
	13		Ans. 10 <i>lb.</i> 3 <i>oz.</i> 1 <i>dwt.</i>
	208		
	16		
	1248		
	208		
	Ans. 3328 <i>drs.</i>		

	<i>Yd.</i>	<i>qr.</i>	<i>na.</i>	<i>Gals.</i>
(32)	12	2	1	(33) 63)584621(4)9279
	4			567
—				Ans. 2319 <i>t.</i> 3 <i>hds.</i> 44 <i>g.</i>
50				176
4				126
—				
Ans. 201 <i>na.</i>				502
—				441

	<i>lbs.</i>	<i>oz.</i>	<i>611</i>
(34)	725	6	567
	16		—
—			44 <i>gals.</i>
4356			—
725			—
—			—
11606			(35) 28)27552(4)984
16			252
—			—
69636			235
11606			224
—			—
Ans. 185696 <i>drs.</i>			248 <i>cwt.</i> Ans.
—			—
			112
			112

SINGLE RULE OF THREE.

61

	<i>£ s. d.</i>	<i>Days.</i>	<i>£ s. d.</i>
(36)	5 4 6 $\frac{1}{4}$	7,763	85 10 7
	20		20
	<hr/>	<hr/>	<hr/>
	104	Ans. 109 w.	1710
	12	<hr/>	12
	<hr/>		<hr/>
	1254		Ans. 20527 d.
	4		<hr/>

Ans. 5017 far.

	<i>Grs.</i>	<i>Qrs.</i>
(39)	2 0)122 0	(40) 5)27
	<hr/>	<hr/>
	3)61	Ans. 5 E. E. 2 qrs.
	<hr/>	<hr/>
	Ans. 20 3 1 B	

	<i>Pts.</i>	<i>per.</i>
(41)	2)1357	(42) 4 0)865 4
	<hr/>	<hr/>
	8)678 + 1 pt.	4)216 + 14 per.
	<hr/>	<hr/>
	4)84 + 6 qts.	Ans. 54 a. 0 r. 14 p.

Ans. 21 bu. 0 p. 6 qts. 1 pt.

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SINGLE RULE OF THREE.

EXAMPLES.

- lbs. lbs. cts. cts.*
- (3) State the question thus: As 2 : 8 :: 50 : 200 Ans.
For $50 \times 8 = 400 \div 2 = 200$ cts.

SINGLE RULE OF THREE.

lb. lbs. cts. cts.

- (4) As $1 : 5 :: 12 : 60$
For $12 \times 5 = 60 \div 1 = 60$ cts. Ans.

yds. yd. cts. cts.

- (5) As $10 : 1 :: 550 : 55$
For $550 \times 1 = 550$ which $\div 10 = 55$ cts. Ans.

lbs. lbs. cts. £ cts.

- (6) As $7 : 122 :: 87\frac{1}{2} : 15\ 25$
For $87\frac{1}{2} \times 122 = 10675$ which $\div 7 = \underline{\$}15\ 25$ cts. Ans.

bu. bu. cts. £ cts.

- (7) As $1 : 209 :: 72 : 150\ 48$
For $72 \times 209 = 15048$ which $\div 1 = \underline{\$}150\ 48$ cts. Ans.

lbs. lb. cts. cts.

- (8) As $5 : 1 :: 55 : 11$
For $55 \times 1 = 55$ which $\div 5 = 11$ cts. Ans.

yd. yds. £ cts. £ cts.

- (9) As $1 : 18 :: 4\ 25 : 76\ 50$
For $425 \times 18 = 7650$ which $\div 1 = \underline{\$}76\ 50$ cts. Ans.

lbs. lb. £ cts. cts.

- (10) As $76 : 1 :: 24\ 32 : 32$
For $2432 \times 1 = 2432$ which $\div 76 = 32$ cts. Ans.

bu. bu. £ cts. cts. m.

- (11) As $8 : 1 :: 3\ 94 : 49\ 2+4$
For $394 \times 1 = 394$ which $\div 8 = 49$ cts. 2 m.+4 Ans.

lb. lbs. cts. £ cts.

- (12) As $1 : 57 :: 7\frac{1}{2} : 4\ 27\frac{1}{2}$
For $7\frac{1}{2} \times 57 = 427\frac{1}{2}$ which $\div 1 = \underline{\$}4\ 27\frac{1}{2}$ cts. Ans.

bu. bu. cts. £ cts.

- (13) As $1 : 243 :: 45 : 109\ 35$
For $45 \times 243 = 10935$ which $\div 1 = \underline{\$}109\ 35$ cts. Ans.

lb. lbs. £ cts. £ cts.

- (14) As $1 : 147 :: 1\ 12\frac{1}{2} : 165\ 37\frac{1}{2}$ Ans.
For $112\frac{1}{2} \times 147 = 16537\frac{1}{2}$ which $\div 1 = \underline{\$}165\ 37\frac{1}{2}$ cts.

lb. lbs. cts. £ cts.

- (15) As $1 : 869 :: 4\frac{1}{2} : 39\ 10\frac{1}{2}$
For $4\frac{1}{2} \times 869 = 3910\frac{1}{2}$ which $\div 1 = \underline{\$}39\ 10\frac{1}{2}$ cts. Ans.

SINGLE RULE OF THREE.

63

yds. yd. \$ cts. \$ cts.

- (16) As 24 : 1 :: 125 24 : 5 21+20 Ans.
 For $12524 \times 1 = 12524$ which $\div 24 = \$5\ 21\ cts.\ + 20$

C. lb. £ cts. cts. m.

(17) As 1 : 1 :: 11 50 : 10 2+76
 lbs. £ cts. cts. m.
 Or, as 112 : 1 :: 11 50 : 10 2+76 Ans.
 For $1150 \times 1 = 1150$ which $\div 112 = 10\ cts.\ 2\ m.\ + 76$

lb. lbs. cts. £ cts.

(18) As 1 : 218 :: 7 : 15 26
 For $7 \times 218 = 1526$ which $\div 1 = \$15\ 26\ cts.$ Ans.

bu. bu. £ s. s. d. £

(19) As 57 : 1 :: 30 10 : 10 8 $\frac{1}{4}$ +39
 bu. bu. s. s. d.
 Or, as 57 : 1 :: 610 : 10 8 $\frac{1}{4}$ +
 For $610 \times 1 = 610$ which $\div 57 = 10s.\ 8\frac{1}{4}d.\ + 39$ Ans.

oz. lbs. oz. cts. £ cts.

(20) As 1 : 3 5 :: 72 : 29 52
 oz. oz. cts. £ cts.
 Or, as 1 : 41 :: 72 : 29 52.
 For $72 \times 41 = 2952$ which $\div 1 = \$29\ 52\ cts.$ Ans!

lb. lbs. cts. £ cts.

(21) As 1 : 135 :: 10 : 13 50
 For $10 \times 135 = 1350$ which $\div 1 = \$13\ 50\ cts.$ Ans.

C. T. C. £ s. d. £ s. d.

(22) As 2 : 15 3 :: 7 12 6 :: 1155 3 9
 C. C. d. £ s. d.
 Or, as 2 : 303 :: 1830 : 1155 3 9
 For $1830 \times 303 = 554490$ which $\div 2 = 277245d.\ = \$1155\ 3s.\ 9d.$ Ans.

s. d. £ s. d. gal. gals.

(23) As 4 10 : 54 7 8 :: 1 : 225
 d. d. gal. gals.
 Or, as 58 : 13050 :: 1 : 225
 For $1 \times 13050 = 13050$ which $\div 58 = 225\ gals.$ Ans.

w. w. cts. £ cts.

(24) As 1 : 52 :: 250 : 130, 00
 For $250 \times 52 = 13000$ which $\div 1 = \$130\ 00\ cts.$ Ans.

SINGLE RULE OF THREE.

- A. A. R. P. \$ cts. \$ cts.*
- (25) As $1 : 34 \frac{1}{17} :: 42 \frac{25}{25} : 1451 \frac{55+25}{55}$
P. P. \$ cts. \$ cts.
 Or, as $160 : 5497 :: 42 \frac{25}{25} : 1451 \frac{55+25}{55}$
 For $4225 \times 5497 = 23224825$ which $\div 160 = \$1451$
 $55 \text{ cts.} + 25 \text{ Ans.}$
- gals. gal. £ s. s.*
- (26) As $131 : 1 :: 65 \frac{10}{10} : 10$
gals. gal. s. s.
 Or, as $131 : 1 :: 1310 : 10$
 For $1310 \times 1 = 1310$ which $\div 131 = 10s.$ Ans.
- \$ \$ T. T. hhd. gal. qt. pt.*
- (27) As $754 : 1754 :: 1 : 2 \frac{1}{19} \frac{0}{1}$
 For $1 \times 1754 = 1754$ which $\div 754 = 2 \frac{1}{19} \text{ hhd. } 1 \frac{0}{1}$
 $\text{gal. } 0 \text{ qt. } 1 \text{ pt. Ans.}$
- s. d. £ s. yds. yds.*
- (28) As $18 \frac{8}{8} : 36 \frac{16}{16} :: 7 : 276$
d. d. yds. yds.
 Or, as $224 : 8832 :: 7 : 276$
 For $8832 \times 7 = 61824$ which $\div 224 = 276 \text{ yds. Ans.}$
- lb. cwt. qrs. lbs. cts. \$ cts. m.*
- (29) As $1 : 5 \frac{2}{2} \frac{17}{17} :: 9 \frac{1}{2} : 60 \frac{13}{13} 5$
lb. lbs. cts. \$ cts. m.
 Or, as $1 : 633 :: 9 \frac{1}{2} : 60 \frac{13}{13} 5$
 For $9 \frac{1}{2} \times 633 = 6013 \frac{1}{2}$ which $\div 1 = \$60 \frac{13}{13} 5 \text{ cts. } 5 \text{ m. Ans.}$
- cts. \$ lb. lbs. oz. dr.*
- (30) As $114 : 354 :: 1 : 310 \frac{8}{8} \frac{6+84}{6+84}$
 For $1 \times 35400 = 35400$ which $\div 114 = 310 \text{ lbs. } 8 \text{ oz.}$
 $6 \text{ dr.} + 84 \text{ Ans.}$
- £ s. £ s. skeins. skeins.*
- (31) As $2 \frac{10}{10} : 105 \frac{3}{3} :: 100 : 4206$
s. s. skeins. skeins.
 Or, as $50 : 2103 :: 100 : 4206$
 For $100 \times 2103 = 210300$ which $\div 50 = 4206 \text{ sk. Ans.}$
- yds. yd. \$ cts. \$ cts. m.*
- (32) As $39 : 1 :: 350 \frac{38}{38} : 8 \frac{98}{98} \frac{4+}{4+}$ Ans.
 For $35038 \times 1 = 35038$ which $\div 39 = \$8 \frac{98}{98} \text{ cts. } 4 \text{ m.}$

$$(33) \begin{array}{r} gals. qts. gals. qt. pt. gals. qts. pt. \\ 61\frac{1}{2} gals. = 61 \quad 2+62 \quad 1 \quad 1 = 123 \quad 3 \quad 1 \\ \text{pt. gals. qts. pt. cts. } \quad \text{cts. } \end{array}$$

Then as $1 : 123 \quad 3 \quad 1 :: 37\frac{1}{2} : 371 \quad 62\frac{1}{2}$
 $\text{pt. pts. cts. } \quad \text{cts. }$

Or, as $1 : 991 :: 37\frac{1}{2} : 371 \quad 62\frac{1}{2}$

For $37\frac{1}{2} \times 991 = 37162\frac{1}{2}$ which $\div 1 = \$371 \quad 62\frac{1}{2} \text{ cts. Ans.}$

bu. bu. bu.

$$(34) 75 + 87 = 162$$

bu. bu. cts. \$ cts.

Then as $1 : 162 :: 52 : 84 \quad 24$

For $52 \times 162 = 8424$ which $\div 1 = \$84 \quad 24 \text{ cts. Ans.}$

(35) 1 year equals 365 days.

day. days. cts. \$ cts.

Then as $1 : 365 :: 187\frac{1}{2} : 684 \quad 37\frac{1}{2}$

For $187\frac{1}{2} \times 365 = 68437\frac{1}{2}$ which $\div 1 = \$684 \quad 37\frac{1}{2} \text{ cts.}$

the sum he spends in a year; his income yearly
 is $\$1022 - \$684 \quad 37\frac{1}{2} \text{ cts.} = \$337 \quad 62\frac{1}{2} \text{ cts. Ans.}$

cwt. cwt. qrs. lb. \$ cts. \$ cts.

$$(36) \text{ As } 1 : 4 \quad 3 \quad 24 :: 2 \quad 10 : 10 \quad 42\frac{1}{2}$$

lbs. lbs. cts. \$ cts.

Or, as $112 : 556 :: 210 : 10 \quad 42\frac{1}{2}$ price of stove.

For $210 \times 556 = 110760$ which $\div 112 = \$10 \quad 42\frac{1}{2} \text{ cts.}$
 price of stove.

Then $27 \text{ lbs.} \times 18\frac{3}{4} \text{ cts.} = \$5 \quad 06\frac{1}{4} \text{ cts. amount of pipe,}$
 and $50 \text{ cts.} \times 2 = \$1.00 \text{ price of 2 elbows.}$

$+\$10 \quad 42\frac{1}{2} \text{ cts. price of stove.}$

$+\$5 \quad 06\frac{1}{4} \text{ cts. do. pipe.}$

$+\$1 \quad 00 \text{ cts. do. elbows.}$

$\$16 \quad 48\frac{3}{4}$ Ans.

(37) 14 pair $\times 2 = 28$ single shutters, which $\times 8\frac{1}{2} = 238$
 whole number of sheets used.

sheet sheets. cts. \$ cts.

Then as $1 : 238 :: 11\frac{1}{2} : 27 \quad 37$

For $238 \times 11\frac{1}{2} = 2737$ which $\div 1 = \$27 \quad 37 \text{ cts. Ans.}$

- (38) If 45 men eat 1 lb. per day each, they will altogether eat 45 lbs. in a day.

lbs. lbs. d. w. d.
Then as $45 : 4500 :: 1 : 14\frac{2}{3}$

For $1 \times 4500 = 4500$ which $\div 45 = 100$ d. = 14 weeks
2 days. Ans.

- A. R. A. R. P. bu. pe. bu. pe. qts. pt.*
(39) As $12\frac{2}{3} : 37\frac{3}{5} :: 443\frac{3}{4} : 1341\frac{0}{7}\frac{1}{1}$

P. P. pe. bu. pe. qts. pt.
Or, as $2000 : 6045 :: 1775 : 1341\frac{0}{7}\frac{1}{1}$

For $1775 \times 6045 = 10729875$ which $\div 2000 = 1341$ bu.
0 pe. 7 qts. 1 pt. Ans.

- § cts.*
(40) Amount paid for the sugar $204\ 00$
carriage $15\ 75$
storage $18\ 31\frac{1}{4}$
and would gain $57\ 00$

$\underline{\$295\ 06\frac{1}{4}}$ the sum the

whole must sell for.

C. qrs. C. § cts. § cts. m.
Then as $27\frac{2}{3} : 1 :: 295\ 06\frac{1}{4} : 10\ 72\ 9+60$

qrs. qrs. cts. § cts. m.
Or, as $110 : 4 :: 29506\frac{1}{4} : 10\ 72\ 9+60$

For $29506\frac{1}{4} \times 4 = 118025$ which $\div 110 = \$10\ 72$ cts.
9 m. + Ans.

- (41) To find how much per cent. he can pay.

§ cts. § cts. § §
As $18284\ 40 : 9142\ 20 :: 100 : 50$ per cent.

For $100 \times 914220 = 91422000$ which $\div 1828440 =$
50 Ans. the first.

To find what the creditor is to receive.

§ cts. § cts. § §
As $18284\ 40 : 9142\ 20 :: 472 : 236$

For $472 \times 914220 = 431511840$ which $\div 1828440 =$
\\$236 Ans.

INVERSE PROPORTION.

m. m. d. d.

- (42) As $12 : 6 :: 18 : 9$
For $18 \times 6 = 108$ which $\div 12 = 9$ days. Ans.

m. m. d. d. h.

- (43) As $18 : 12 :: 20 : 13 \frac{1}{4}$
For $20 \times 12 = 240$ which $\div 18 = 13$ days 4 hours. Ans.

d. d. m. m

- (44) As $4 : 24 :: 8 : 48$
For $8 \times 24 = 192$ which $\div 8 = 48$ men. Ans.

m. m. d. d.

- (45) As $48 : 12 :: 24 : 6$
For $24 \times 12 = 288$ which $\div 48 = 6$ days. Ans.

h. h. d. d. h.

- (46) As $15 : 11 :: 5 : 3 \frac{1}{2}$
For $5 \times 11 = 55$ which $\div 15 = 3$ days 10 hours. Ans.

ft. in. ft. in. ft. yds. ft. in.

- (47) As $2 \frac{2}{3} : 30 \frac{6}{7} :: 48 : 216 \frac{2}{3} \frac{1}{2}$
in. in. ft. yds. ft. in.
Or, as $27 : 366 :: 48 : 216 \frac{2}{3} \frac{1}{2}$
For $48 \times 366 = 17568$ which $\div 27 = 650 \frac{1}{3}$ ft. = 216
yds. 2 ft. 8 in. Ans.

d. d. m. m.

- (48) As $50 : 100 :: 14 : 28$
For $14 \times 100 = 1400$ which $\div 50 = 28$ men. Ans.

PROMISCUOUS EXAMPLES.

Cwt. Cwt. qrs. lbs. £ cts.

- (49) As $1 : 18 \frac{3}{4} 19 :: 11 37 \frac{1}{2}$
Cwt. qrs. lbs. lbs.
For $18 \frac{3}{4} 19 = 2119$ which $\times 1137 \frac{1}{2} = 2410362$, the divisor; which $\div 1$ cwt., that is 112 lbs. = $215 \frac{1}{2} + 10 \frac{1}{2}$ Ans.

£ £ £

- (50) $730 - 22 = 708$
yds. yd. £ £ cts. m.
Then as $156 : 1 :: 708 : 4 53 8 +$ Ans.
For $708 \times 1 = 708$ which $\div 156 = 4 53$ cts. 8 m. + 72

- (51) To find the prime cost.

C. C. qrs. lbs. £ cts. £ cts. m.

1 : 19 2 17 :: 9 31 $\frac{1}{4}$: 183 00 7+

lbs. lbs. £ cts. £ cts. m.

Or, as 112 : 2201 :: 9 31 $\frac{1}{4}$: 183 00 7+

For $931\frac{1}{4} \times 2201 = 2049681\frac{1}{4}$ which $\div 112 = \pounds 183$
00 cts. 7 m.+ Ans.

To find the sum it sold for.

lbs. lbs. £ cts. £ cts. m.

As 112 : 2201 :: 10 65 : 209 29 1+

For $1065 \times 2201 = 2344065$ which $\div 112 = \pounds 209$ 29
cts. 1 m. Ans.

To find the gain. It sold for £209 29 cts. 1 m.—

£183 00 cts. 7 m. = £26 28 cts. 4 m.

yds. yd. £ cts. cts. m.

- (52) As 47 :-1 :: 14 75 : 31 3+

For $1475 \times 1 = 1475$ which $\div 47 = 31$ cts. 3 m.+ Ans.

- (53) 3 qrs. wide : $1\frac{1}{4}$ wide :: $3\frac{3}{4}$ long : $6\frac{1}{2}$ long.

For $3\frac{3}{4} = 15$ qrs. and $1\frac{1}{4} = 5$ qrs. therefore $15 \times 5 = 75$ which $\div 3 = 25$ qrs.=the quantity of holland
requisite for each suit, and this 25 qrs. $\times 354$
suits or men=8850 qrs. which $\div 4 = 2212\frac{1}{2}$ yds.
Ans.

- (54) First 25 ft. : 250 ft. :: 33 ft. 10 in. : 338 ft. 4 in.

For $33 10 \times 12 = 406$ in. $\times 250 = 101500$ which $\div 25$
 $= 4060$ in. = 338 ft. 4 in. the length of the shadow
of the tower. Then as the shadow is 18 ft. 6 in.
longer than the width of the river, consequently
338 ft. 4 in.—18 ft. 6 in. = 319 ft. 10 in. the width
of the river. Ans.

- (55) First, 24 hrs. : 360 deg. :: 1 m. : 17 m. 3 fur. 1st
Ans.

For $360 \times 69\frac{1}{2} \times 1 = 25020$ and 24 hrs. $\times 60 = 1440$;
therefore $25020 \div 1440 = 17$ m. 3 fur.

Again, 24 hrs. : 360 deg. :: 1 m. : 11 m. 4 fur.=
the velocity of the earth in lat. 40 deg.

For $360 \times 46 = 16560 \div 1440 = 11$ m. 4 fur.

Then, 17 m. 3 fur.—11 m. 4 fur.=5 m. 7 fur. 2d Ans.

DOUBLE RULE OF THREE.

EXAMPLES.

- (2) Thus $3 \text{ m.} : 8 \text{ m.} \left\{ \begin{array}{l} \\ 12 \text{ d.} : 24 \text{ d.} \end{array} \right\} :: 32 \text{ A.} : 170 \text{ A. } 2 \text{ R. } 26 \text{ P. } 20 \text{ yds.} +$
 For $8 \times 24 \times 32 = 6144$ the dividend.
 And $3 \times 12 = 36$ the divisor.
 Then $6144 \div 36 = 170 \text{ A. } 2 \text{ R. } 26 \text{ P. } 20 \text{ yds.} +$ Ans.
- (3) Thus $10 \text{ ox.} : 20 \text{ ox.} \left\{ \begin{array}{l} \\ 18 \text{ d.} : 27 \text{ d.} \end{array} \right\} :: 2 \text{ A.} : 6 \text{ A.}$
 For $20 \times 27 \times 2 = 1080$ the dividend.
 And $18 \times 10 = 180$ the divisor.
 Then $1080 \div 180 = 6 \text{ A.}$ Ans.
- (4) Thus $9 \text{ m.} : 24 \text{ m.} \left\{ \begin{array}{l} \\ 10 \text{ d.} : 5 \text{ d.} \end{array} \right\} :: 36 \text{ lbs.} : 48 \text{ lbs.}$
 For $24 \times 5 \times 36 = 4320$ the dividend.
 And $9 \times 10 = 90$ the divisor.
 Then $4320 \div 90 = 48 \text{ lbs.}$ Ans.
- (5) Thus $\$100 : \$335 \left\{ \begin{array}{l} \\ 12 \text{ m.} : 18 \text{ m.} \end{array} \right\} :: \$6 : \$30 \text{ } 15 \text{ cts.}$
 For $335 \times 18 \times 6 = 36180$ the dividend.
 And $100 \times 12 = 1200$ the divisor.
 Then $36180 \div 1200 = \$30 \text{ } 15 \text{ cts.}$ Ans.
- (6) Thus $20 \text{ m.} : 46 \text{ m.} \left\{ \begin{array}{l} \\ 5 \text{ d.} : 32 \text{ d.} \end{array} \right\} :: \$56 \text{ } 31\frac{1}{4} \text{ cts.} : \$828 \text{ } 92 \text{ cts.}$
 For $46 \times 32 \times 5631\frac{1}{4} = 8289200$ the dividend.
 And $20 \times 5 = 100$ the divisor.
 Then $8289200 \div 100 = \$828 \text{ } 92 \text{ cts.}$ Ans.
- (7) Thus $8 \text{ m.} : 12 \text{ m.} \left\{ \begin{array}{l} \\ 30 \text{ d.} : 90 \text{ d.} \end{array} \right\} :: 120 \text{ pairs.} : 540 \text{ pairs.}$
 For $12 \times 90 \times 120 = 129600$ the dividend.
 And $8 \times 30 = 240$ the divisor.
 Then $129600 \div 240 = 540 \text{ pairs.}$ Ans.
- (8) Thus $12 \text{ p.} : 38 \text{ p.} \left\{ \begin{array}{l} \\ 4 \text{ d.} : 16 \text{ d.} \end{array} \right\} :: 37 \text{ lbs.} : 468 \text{ lbs. } 10\frac{2}{3} \text{ oz.}$
 For $38 \times 16 \times 37 = 22496$ the dividend.
 And $12 \times 4 = 48$ the divisor.
 Then $22496 \div 48 = 468 \text{ lbs. } 10\frac{2}{3} \text{ oz.}$ Ans.

$$(9) \text{ Thus } 8\text{li.} : 12\text{li.} \left. \begin{array}{l} \\ 4\text{E.} : 7\text{E.} \end{array} \right\} :: 5\text{ pts.} : 13\text{ pts.} +$$

For $12 \times 7 \times 5 = 420$ the dividend.

And $8 \times 4 = 32$ the divisor.

Then $420 \div 32 = 13+$ Ans.

$$(10) \text{ Thus } 7\frac{1}{2}\text{yds.} : 24\text{yds.} 2\text{qrs.} \left. \begin{array}{l} \\ 3\text{qrs.} : 7\text{qrs.} \end{array} \right\} :: \$17 37\frac{1}{2}\text{cts.} : \$$$

43 ct.

For $24 \times 7 = 98$ qrs. And $7\frac{1}{2}\text{yds.} = 30$ yds.

Then $98 \times 7 \times 1737\frac{1}{2} = 1191925$ the dividend.

And $30 \times 3 = 90$ the divisor.

Then $1191925 \div 90 = \$132 43\text{cts.} +$ Ans.

$$(11) \text{ Thus } 20\text{h.} : 62\text{h.} \left. \begin{array}{l} \\ 22\text{d.} : 36\text{d.} \end{array} \right\} :: 12\text{bu.} : 60\text{bu.} 3\text{pe.} 3\text{qts.}$$

For $62 \times 36 \times 12 = 26784$ the dividend.

And $20 \times 22 = 440$ the divisor.

Then $26784 \div 440 = 60\text{bu.} 3\text{qts.} 1\text{pt.} + 376$ A.

$$(12) \text{ Thus } \$100 : \$563 \left. \begin{array}{l} \\ 12\text{m.} : 54\text{m.} \end{array} \right\} :: \$6 : \$152 01\text{ct}$$

For $563 \times 18 \times 6 = 182412$ the dividend.

And $100 \times 12 = 1200$ the divisor.

Then $182412 \div 1200 = \$152 01\text{ct}$ Ans.

$$(13) \text{ Thus } 8\text{h.} : 20\text{h.} \left. \begin{array}{l} \\ 7\text{m.} : 17\text{m.} \end{array} \right\} :: 6\text{T.} : 36\text{T.} 8\text{cwt.} 2\text{qrs.} 8\text{lb.}$$

For $20 \times 17 \times 6 = 2040$ the dividend.

And $8 \times 7 = 56$ the divisor.

Then $2040 \div 56 = 36\text{T.} 8\text{cwt.} 2\text{qrs.} 8\text{lb.}$ Ans.

$$(14) \text{ Thus } 2\text{yds.} : 50\text{yds.} \left. \begin{array}{l} \\ 5\text{qrs.} : 3\text{qrs.} \end{array} \right\} :: 1\text{lb.} : 15\text{lbs.}$$

For $50 \times 3 \times 1 = 150$ the dividend.

And $2 \times 5 = 10$ the divisor.

Then $150 \div 10 = 15\text{lbs.}$ Ans.

$$(15) \text{ Thus } \$21 : \$96 \left. \begin{array}{l} \\ 32\text{d.} : 3\text{d.} \end{array} \right\} :: 7\text{re.} : 3\text{re.}$$

For $96 \times 3 \times 7 = 2016$ the dividend.

And $21 \times 32 = 672$ the divisor.

Then $2016 \div 672 = 3$. Ans.

- (16) Thus $4m. : 12m. \left\{ \begin{array}{l} \\ \end{array} \right. :: \$100 : \$360$
 $\$7\frac{1}{2} : \$9 \left\{ \begin{array}{l} \\ \end{array} \right.$
For $12 \times 9 \times 100 = 10800$ the dividend.
And $4 \times 7\frac{1}{2} = 30$ the divisor.
Then $10800 \div 30 = \$360$. Ans.
- (17) Inversely thus $40ft. \left\{ \begin{array}{l} \\ \end{array} \right. :: 20ft. \left\{ \begin{array}{l} \\ \end{array} \right.$
 $54ft. \left\{ \begin{array}{l} \\ \end{array} \right. :: 54ft. \left\{ \begin{array}{l} \\ \end{array} \right.$
 $72m. : 27m. \left\{ \begin{array}{l} \\ \end{array} \right.$
For $20 \times 54 \times 72 = 291600$ the dividend.
And $40 \times 54 \times 72 = 155520$ the divisor.
Then $291600 \div 155520 = 1d. 10\frac{1}{2} hrs.$ Ans.
- (18) Thus $305m. : 1056m. \left\{ \begin{array}{l} \\ \end{array} \right. :: 30d. : 116d. + 2540$
 $12\frac{1}{2}h. : 14h. \left\{ \begin{array}{l} \\ \end{array} \right.$
For $1056 \times 14 \times 30 = 443520$ the dividend.
And $305 \times 12\frac{1}{2} = 3812\frac{1}{2}$ the divisor.
Then $443520 \div 3812\frac{1}{2} = 116d. +$ Ans.
- (19) Thus $\$210 : \$837 \left\{ \begin{array}{l} \\ \end{array} \right. :: 24w. 3d. : 25w. 6d. +$
 $15m. : 4m. \left\{ \begin{array}{l} \\ \end{array} \right.$
For $24w. 3d. = 171d.$ And $837 \times 4 \times 171 = 572508$ the dividend.
And $210 \times 15 = 3150$ the divisor.
Then $572508 \div 3150 = 181d. = 25w. 6d. + 2358$ Ans.
- (20) Thus $2\frac{1}{2}yrs. : 5yrs. \left\{ \begin{array}{l} \\ \end{array} \right. :: \$50 : \$200$
 $\$15 : \$30 \left\{ \begin{array}{l} \\ \end{array} \right.$
For $5 \times 30 \times 50 = 7500$ the dividend.
And $2\frac{1}{2} \times 15 = 37\frac{1}{2}$ the divisor.
Then $7500 \div 37\frac{1}{2} = \200 . Ans.
- (21) Thus $5m. : 34m. \left\{ \begin{array}{l} \\ \end{array} \right. :: \$20 50 cts. : \$3136 50 cts.$
 $4d. : 90d. \left\{ \begin{array}{l} \\ \end{array} \right.$
For $34 \times 90 \times 2050 = 6273000$ the dividend.
And $5 \times 4 = 20$ the divisor.
Then $6273000 \div 20 = \$3136 50 cts.$ Ans.
- (22) Thus $24cwt. : 76cwt. \left\{ \begin{array}{l} \\ \end{array} \right. :: \$18 : \$153 26 cts. + 720$
 $45m. : 121m. \left\{ \begin{array}{l} \\ \end{array} \right.$
For $76 \times 121 \times 18 = 165528$ the dividend.
And $24 \times 45 = 1080$ the divisor.
Then $165528 \div 1080 = \$153 26 cts.$ Ans. +

$$(23) \text{ Thus } 42\text{A.} : 392\text{A.} \left. \begin{array}{l} \\ 14\text{D.} : 7\text{D.} \end{array} \right\} :: 6\text{men} : 28\text{men.}$$

For $392 \times 7 \times 6 = 16464$ the dividend.

And $42 \times 14 = 588$ the divisor.

Therefore $16464 \div 588 = 28\text{men.}$ Ans.

$$(24) \text{ Thus } 35\text{cwt.} : 50\text{cwt.} \left. \begin{array}{l} \\ 20\text{m.} : 150\text{m.} \end{array} \right\} :: \$9 50\text{cts.} : \$101 78\frac{1}{2}\text{cts.}$$

For $50 \times 150 \times 950 = 7125000$ the dividend.

And $35 \times 20 = 700$ the divisor.

Then $7125000 \div 700 = \$101 78\frac{1}{2}\text{cts.} +$ Ans.

$$(25) \text{ Thus } \$11 75\text{cts.} : \$31 18\frac{3}{4}\text{cts.} \left. \begin{array}{l} \\ 9\text{m.} : 1\text{yr. } 6\text{mo.} \end{array} \right\} :: \$125 : \$663 5\text{cts.}$$

For $3118\frac{3}{4} = 12475\text{qrs.} \times 18\text{m.} \times 125 = 28068750$ the dividend.

And $\$11 75\text{cts.} = 4700\text{qrs.} \times 9 = 42300$ the divisor.

Then $28068750 \div 42300 = \$663 56\frac{1}{4}\text{cts.} +$ Ans.

$$(26) \text{ Thus } \$100 : \$275 \left. \begin{array}{l} \\ 12\text{m.} : 56\text{m.} \end{array} \right\} :: \$6 : \$77$$

For $275 \times 56 \times 6 = 92400$ the dividend.

And $100 \times 12 = 1200$ the divisor.

Then $92400 \div 1200 = \$77.$ Ans.

$$(27) \text{ Thus } \$56 : \$6 \left. \begin{array}{l} \\ 12\text{m.} : 20\text{m.} \end{array} \right\} :: \$560 : \$100$$

For $6 \times 20 \times 560 = 67200$ the dividend.

And $56 \times 12 = 672$ the divisor.

Then $67200 \div 672 = \$100.$ Ans.

$$(28) \text{ Thus } 12\text{yds.} : 75\text{yds.} \left. \begin{array}{l} \\ 5\text{grs.} : 3\text{grs.} \end{array} \right\} :: 5\text{lb.} : 18\text{lb. } 12\text{oz.}$$

For $75 \times 3 \times 5 = 1125$ the dividend.

And $12 \times 5 = 60$ the divisor.

Then $1125 \div 60 = 18\text{lb. } 12\text{oz.}$ Ans.

PRACTICE.

EXAMPLES.

CASE 1.

$$(3) \begin{array}{r} 296 \text{ at } \frac{3}{4} \\ \hline 148 \\ 74 \end{array}$$

Ans. \$2 22 cts.

$$(4) \begin{array}{r} 3268 \text{ at } \frac{1}{2} \\ \hline \end{array}$$

Ans. \$16 34 cts.

$$(5) \begin{array}{r} 4260 \text{ at } \frac{2}{3} \\ \hline 2130 \\ 1065 \end{array}$$

Ans. \$31 95 cts.

$$(6) \begin{array}{r} 5324 \text{ at } \frac{1}{4} \\ \hline \end{array}$$

Ans. \$13 31 cts.

$$(7) \begin{array}{r} m. \\ 2 | 634 \text{ at } 2 \text{ mills.} \\ \hline \end{array}$$

Ans. \$1 26 8

$$(8) \begin{array}{r} m. \\ 2 | 352 \text{ at } 4 \text{ mills.} \\ \hline 2 | 70 4 \\ 2 | 70 4 \end{array}$$

Ans. \$1 40 8

$$(9) \begin{array}{r} m. \\ 5 | 3456 \text{ at } 5 \text{ mills.} \\ \hline \end{array}$$

Ans. \$17 28

$$(10) \begin{array}{r} m. \\ 5 | 498 \text{ at } 6 \text{ mills.} \\ \hline 1 | 249 \\ 1 | 49 8 \end{array}$$

Ans. \$2 98 8

PRACTICE.

$$(11) \begin{array}{r} m. \\ \left| \begin{array}{r} 5 \\ 1 \\ \hline 2 \\ 1 \\ \hline 1 \\ \hline \end{array} \right| 8462 \text{ at } 8 \text{ mills.} \\ \hline \\ \begin{array}{r} 4231 \\ 1692 \quad 4 \\ \hline 846 \quad 2 \end{array} \end{array} \quad (12) \begin{array}{r} m. \\ \left| \begin{array}{r} 5 \\ 1 \\ \hline 2 \\ 1 \\ \hline 2 \\ \hline \end{array} \right| 1264 \text{ at } 7 \text{ mills.} \\ \hline \\ \begin{array}{r} 632 \\ 252 \quad 8 \\ \hline \end{array} \end{array}$$

Ans. §67 69 6Ans. §8 84 8

$$(13) \begin{array}{r} m. \\ \left| \begin{array}{r} 5 \\ 1 \\ \hline 2 \\ 1 \\ \hline 2 \\ \hline \end{array} \right| 4628 \text{ at } 9 \text{ mills.} \\ \hline \\ \begin{array}{r} 2314 \\ 925 \quad 8 \\ \hline 925 \quad 6 \end{array} \end{array}$$

Ans. §41 65 2

CASE 2.

$$(2) \begin{array}{r} cts. \\ \left| \begin{array}{r} 6 \\ 1 \\ \hline 1 \\ \hline \end{array} \right| 3648 \text{ at } 6\frac{1}{4} \text{ cts.} \\ \hline \\ \text{Ans. } \underline{\underline{§228}} \end{array} \quad (3) \begin{array}{r} cts. \\ \left| \begin{array}{r} 10 \\ 1 \\ \hline 1 \\ \hline \end{array} \right| 742 \text{ at } 10 \text{ cts.} \\ \hline \\ \text{Ans. } \underline{\underline{§74 20}} \end{array}$$

$$(4) \begin{array}{r} cts. \\ \left| \begin{array}{r} 20 \\ 1 \\ \hline 3 \\ \hline \end{array} \right| 3264 \text{ at } 20 \text{ cts.} \\ \hline \\ \text{Ans. } \underline{\underline{§1652 80}} \end{array} \quad (5) \begin{array}{r} cts. \\ \left| \begin{array}{r} 25 \\ 1 \\ \hline 4 \\ \hline \end{array} \right| 386 \text{ at } 25 \text{ cts.} \\ \hline \\ \text{Ans. } \underline{\underline{§96 50}} \end{array}$$

$$(6) \begin{array}{r} cts. \\ \left| \begin{array}{r} 50 \\ 1 \\ \hline 2 \\ \hline \end{array} \right| 5876 \text{ at } 50 \text{ cts.} \\ \hline \\ \text{Ans. } \underline{\underline{§2938}} \end{array} \quad (7) \begin{array}{r} cts. \\ \left| \begin{array}{r} 25 \\ 1 \\ \hline 4 \\ \hline 20 \\ 1 \\ \hline \end{array} \right| 3542 \text{ at } 45 \text{ cts.} \\ \hline \\ \begin{array}{r} 885 \quad 50 \\ 708 \quad 40 \\ \hline \end{array} \\ \text{Ans. } \underline{\underline{§1593 90}} \end{array}$$

PRACTICE.

75

$$(8) \begin{array}{r} cts. \\ \hline 50 | \frac{1}{2} | 31925 \text{ at } 80 \text{ cts.} \\ 25 | \frac{1}{2} | 15962 \ 50 \\ 5 | \frac{1}{3} | 7981 \ 25 \\ \hline 1596 \ 25 \end{array} \quad (9) \begin{array}{r} cts. \\ \hline 12 | \frac{1}{2} | 4264 \text{ at } 12\frac{1}{2} \text{ cts.} \\ \hline \end{array}$$

Ans. $\$533$ Ans. $\$25540 \ 00$

$$(10) \begin{array}{r} cts. \\ \hline 50 | \frac{1}{2} | 18626 \text{ at } 55 \text{ cts.} \\ 25 | \frac{1}{2} | 1724 \text{ at } 37\frac{1}{2} \text{ cts.} \\ 5 | \frac{1}{16} | 9313 \\ \hline 931 \ 30 \end{array} \quad (11) \begin{array}{r} cts. \\ \hline 12 | \frac{1}{2} | 8646 \text{ at } 50 \text{ cts.} \\ 25 | \frac{1}{2} | 215 \ 50 \\ \hline 431 \end{array}$$

Ans. $\$10244 \ 30$ Ans. $\$646 \ 50$

$$(12) \begin{array}{r} cts. \\ \hline 10 | \frac{1}{16} | 528 \text{ at } 16 \text{ cts.} \\ 5 | \frac{1}{4} | 52 \ 80 \\ 1 | \frac{1}{3} | 26 \ 40 \\ \hline 5 \ 28 \end{array} \quad (13) \begin{array}{r} cts. \\ \hline 50 | \frac{1}{2} | 13854 \text{ at } 56\frac{1}{4} \text{ cts.} \\ 6 | \frac{1}{8} | 6927 \\ \hline 865 \ 87 \ 5 \end{array}$$

Ans. $\$34 \ 48$ Ans. $\$7792 \ 87 \ 5$

$$(14) \begin{array}{r} cts. \\ \hline 20 | \frac{1}{2} | 4858 \text{ at } 29 \text{ cts.} \\ 5 | \frac{1}{4} | 971 \ 60 \\ 4 | \frac{1}{3} | 242 \ 90 \\ \hline 194 \ 32 \end{array} \quad (15) \begin{array}{r} cts. \\ \hline 50 | \frac{1}{2} | 2287 \text{ at } 85 \text{ cts.} \\ 25 | \frac{1}{2} | 1133 \ 50 \\ 10 | \frac{1}{3} | 566 \ 75 \\ \hline 226 \ 70 \end{array}$$

Ans. $\$1408 \ 82$ Ans. $\$1926 \ 95$

PRACTICE.

$$(16) \begin{array}{r} \text{cts.} \\ \hline 20 | 190 \text{ at } 20 \text{ cts.} \\ \hline \text{Ans. } \$38 \end{array}$$

$$(17) \begin{array}{r} \text{cts.} \\ \hline 12 | 3654 \text{ at } 18\frac{3}{4} \text{ cts.} \\ \hline 6 | 456 \text{ 75} \\ \hline 228 \text{ 37 } 5 \end{array}$$

Ans. \$685 12 5

$$(18) \begin{array}{r} \text{cts.} \\ \hline 50 | 17638 \text{ at } 70 \text{ cts.} \\ \hline 10 | 8819 \\ 10 | 1763 \text{ 80} \\ \hline 1763 \text{ 80} \end{array}$$

Ans. \$12346 60

CASE 3.

$$(2) \begin{array}{r} \$ \text{ cts.} \\ \hline 2 | 10 25 \\ 10 \\ \hline 102 50 \\ 7 | 5 12 5 \\ 0 64 0 \\ \hline \end{array}$$

Ans. \$108 26 5

$$(3) \begin{array}{r} \$ \text{ cts.} \\ \hline 2 | 4 15 \\ 7 \\ \hline 29 05 \\ 1 | 2 07 5 \\ 14 \\ 4 | 0 51 8 \\ 1 | 0 14 8 \\ 0 3 7 \\ \hline \end{array}$$

Ans. \$32 86 5

PRACTICE.

77

(4) Cwt. qr. lb. \$ cts.
 129 1 10 at 1 05
 129

		945
1	1	210
7	1	105
2	1	
1	1	

Ans. \$135 80 4

(6) Cwt. qr. \$
 130 1 at 15
 130

1	1	450
1	1	15
		1950
		3 75

Ans. \$1953 75

(8) qrs. lb. cts.
 2 14 at 2710

2	1	1355
1	4	338 4

Ans. \$16 93 4

(5) Cwt. qr. \$ cts.
 16 2 at 5 18
 16

2	1	3108
1	1	518
		82 88
		2 59

Ans. \$85 47

(7) Cwt. qr. lb. cts.
 25 1 9 at 175
 25

1	1	875
4	1	350
4	1	43 75
1	4	43 7
		6 2+
		6 2+
		1 5+

Ans. \$44 32 6

(9) lb. oz. dwt. gr. \$ cts.
 6 5 10 5 at 4 16
 6

4	1	
1	1	2496
10	1	138 6
5	4	34 6
		17 3
		3

Ans. \$26 86 8

PRACTICE.

lb. oz. dwt. gr. cts.

(10) 27 10 4 18 at 2635 (11) 9 11 17 22 at 61:
27

6 $\frac{1}{2}$	18445	6 $\frac{1}{2}$
	5270	
	<hr/>	
3 $\frac{1}{2}$	711 45	5 $\frac{1}{2}$
1 $\frac{1}{2}$	13 17 5	2 $\frac{1}{2}$
4 $\frac{1}{2}$	6 58 7	12
12	2 19 5	6 $\frac{1}{2}$
6 $\frac{1}{2}$	43 9	2 $\frac{1}{2}$
	5 4	2 $\frac{1}{2}$
	2 7	

Ans. \$733 92 7

Ans. \$61 2

oz. dwt. gr. cts.

(12) 816 13 12 at 12 $\frac{1}{2}$ (13) 27 3 at 9 65
816 27

10 $\frac{1}{2}$	1632	2 $\frac{1}{2}$	6755
816		1930	
	408		
	<hr/>		
102 00		260 55	
2 $\frac{1}{2}$	6	1 $\frac{1}{2}$	4 82
1 $\frac{1}{2}$	1 2	2 $\frac{1}{2}$	2 41
12 $\frac{1}{2}$	6		
	3		

Ans. \$102 08 3

Ans. \$267 78

PRACTICE.

79

$$(14) \quad \begin{array}{r} \text{yd.} \\ 860 \end{array} \quad \begin{array}{r} \text{qr.} \\ 1 \end{array} \quad \begin{array}{r} \text{cts.} \\ 1 \text{ at } 84 \\ 860 \end{array}$$

1	1	5040
		672
		722
		40
		21
		<hr/>

Ans. $\$722\ 61$

$$(15) \quad \begin{array}{r} \text{yd.} \\ 126 \end{array} \quad \begin{array}{r} \text{qr.} \\ 2 \end{array} \quad \begin{array}{r} \text{na.} \\ 2 \text{ at } 475 \\ 126 \end{array}$$

2	1	2850
		950
		475
		598
		50
	2	37
	1	5
		59
		3
		<hr/>

Ans. $\$601\ 46\ 8$

$$(16) \quad \begin{array}{r} \text{gal.} \\ 428 \end{array} \quad \begin{array}{r} \text{qt.} \\ 3 \end{array} \quad \begin{array}{r} \text{cts.} \\ 1 \text{ at } 140 \\ 428 \end{array}$$

2	1	1120
		280
		560
		<hr/>
1	1	599
		20
1	1	70
		35
		<hr/>

Ans. $\$600\ 25$

$$(17) \quad \begin{array}{r} \text{gal.} \\ 765 \end{array} \quad \begin{array}{r} \text{qt.} \\ 3 \end{array} \quad \begin{array}{r} \text{pt.} \\ 1 \text{ at } 218\frac{1}{4} \\ 4 \end{array}$$

2	1	875
		765
		<hr/>
		4375
		5250
		6125
		<hr/>
		6693
		75
1	1	4
1	1	37
1	1	2
		18
		<hr/>
		1
		09
		<hr/>

4) $6701\ 39$

Ans. $\$1675\ 34\frac{3}{4}$

PRACTICE.

(18) *hhd. gal.* $\$$ cts.
 5 $31\frac{1}{2}$ at 47 12
 5

31	1	235	60
2	3	23	56

Ans. $\$259$ 16

(20) *bu. pe.* $\$$ cts.
 120 2 at 35
 120

2	1	700
3	5	
		—
4	200	
1	7	5

Ans. $\$42$ 17 5

(22) *bu. pe. qt. pt.* $\$$ cts.
 1354 1 5 1 at 25
 1354

1	1	100
2	5	125
3	1	75
4	25	
		—
4	338	50
1	6	2
1	3	1
1	7	3
	3	4

Ans. $\$338$ 60 5

(19) *hhd. gal. qt.* $\$$ cts.
 17 15 3 at 64 75
 17

9	1	453	25
3	1	647	5
		—	
3	1	1100	75
3	1	9	25
3	1	3	08
3	1	3	08
		77	1

Ans. $\$1116$ 93 7

(21) *bu. pe. qt.* $\$$ cts.
 780 3 2 at 1 17
 780

2	1	9360
3	19	
		—
1	912	60
2	1	58
2	1	29
	7	3

Ans. $\$913$ 55 0

(23) *A. R. P.* $\$$ cts.
 35 2 18 at 54 35
 35

2	1	27175
3	10305	
	—	
16	1902	25
2	27	17
2	5	43
	67	8

Ans. $\$1935$ 53 8

PRACTICE.

81

$$\begin{array}{r} A.R.P. \quad \$ cts. \\ (24) 146 3 10 at 35 10 \\ \hline 146 \end{array}$$

2	1	21060
		14040
		3510
		<hr/>
		5124 60
1	1	17 55
10	1	8 77 5
		2 19 3+

Ans. $\$5153\ 11\ 8+$

$$\begin{array}{r} A.R.P. \quad \$ cts. \\ (25) 750 1 4 at 12 25 \\ \hline 750 \end{array}$$

1	1	61250
		8575
		<hr/>
		9187 50
4	1	3 06 2
		0 30 6

Ans. $\$9190\ 86\ 8\frac{3}{4}$

APPLICATION.

$$\begin{array}{r} Cwt. qr. lb. \quad \$ cts. \\ (1) 84 2 14 at 10 50 \\ \hline 84 \end{array}$$

2	1	4200
		8400
		<hr/>
		882 00
14	1	5 25
		1 31 2+

Ans. $\$888\ 56\ 2+$

$$\begin{array}{r} Cwt. qr. lb. \quad cts. \\ (2) 17 1 7 at 12 2\frac{1}{2} \\ \hline 2 \end{array}$$

1	1	2425 halves.
		17
		<hr/>
		16975
		2425
		<hr/>
		412 25
7	1	6 06 1
		1 51 5

2)419 89 7 mills.

Ans. $\$209\ 91\ 3$ mills.

$$\begin{array}{r}
 \text{T. cut. gr. } \frac{\$}{cts} \\
 (3) 15 10 3 \text{ at } 80 15 \\
 \hline
 & 15 \\
 & | \\
 & 10 \frac{1}{2} \left| \begin{array}{r} 40075 \\ 8015 \end{array} \right. \\
 & | \\
 & 1202 25 \\
 & 2 \frac{1}{2} \left| \begin{array}{r} 40 07 5 \\ 1 \frac{1}{2} \left| \begin{array}{r} 2 00 33 \\ 1 00 1 \frac{1}{2} \end{array} \right. \end{array} \right. \\
 & | \\
 & \hline
 \text{Ans. } \$1245 33 0\frac{1}{2}
 \end{array}$$

$$\begin{array}{r}
 \text{A. R. P. } \frac{\$}{cts} \\
 (5) 175 3 12 \text{ at } 52 15 \\
 \hline
 & 175 \\
 & | \\
 & 2 \frac{1}{2} \left| \begin{array}{r} 26075 \\ 36505 \\ 5215 \end{array} \right. \\
 & | \\
 & 9126 25 \\
 & 1 \frac{1}{2} \left| \begin{array}{r} 26 07 5 \\ 10 \frac{1}{2} \left| \begin{array}{r} 13 03 7 \\ 2 \frac{1}{2} \left| \begin{array}{r} 3 25 9 \\ 0 65 1 \end{array} \right. \end{array} \right. \end{array} \right. \\
 & | \\
 & \hline
 \text{Ans. } \$9169 27 2
 \end{array}$$

$$\begin{array}{r}
 \text{(6) } 1365 \text{ at } \frac{1}{4} \text{ cts} = \$6 82 \frac{1}{2} \text{ cts. Ans. } (7) 50 \frac{1}{2} \text{ at } 84 \text{ cts} \\
 \hline
 & 50 \frac{1}{2} \\
 & | \\
 & 20 \frac{1}{2} \left| \begin{array}{r} 784 \\ 392 \end{array} \right. \\
 & | \\
 & 10 \frac{1}{2} \left| \begin{array}{r} 156 80 \\ 4 \frac{1}{2} \left| \begin{array}{r} 78 40 \\ 31 36 \end{array} \right. \end{array} \right. \\
 & | \\
 & \hline
 & \$658 56
 \end{array}$$

STERLING MONEY.

CASE 1.

$$(4) \begin{array}{r} | \frac{1}{4} | \frac{1}{4} | 475 \text{ at } \frac{1}{4} \\ | \frac{1}{4} | \frac{1}{4} | \hline 12) 118\frac{3}{4} \end{array}$$

Ans. 9s. 10 $\frac{3}{4}$ d.

$$(5) \begin{array}{r} | \frac{1}{2} | \frac{1}{2} | 299 \text{ at } \frac{1}{2} \\ | \frac{1}{2} | \frac{1}{2} | \hline 12) 149\frac{1}{2} \end{array}$$

Ans. £12s. 5 $\frac{1}{2}$ d.

$$(6) \begin{array}{r} | \frac{1}{3} | \frac{1}{3} | 978 \text{ at } \frac{2}{3} \\ | \frac{1}{3} | \frac{1}{3} | \hline \frac{1}{4} | \frac{1}{3} | 480 \\ | \frac{1}{4} | \frac{1}{3} | \hline 244\frac{1}{2} \\ | \frac{1}{4} | \frac{1}{3} | \hline 12) 733\frac{1}{2} \\ | \frac{1}{4} | \frac{1}{3} | \hline 2|0) 6|1 \end{array}$$

Ans. £3 1s. 1 $\frac{1}{2}$ d.

CASE 2.

$$(2) \begin{array}{r} | \frac{2}{5} | \frac{1}{5} | 978 \text{ at } 2d. \\ | \frac{2}{5} | \frac{1}{5} | \hline 2|0) 16|3 \end{array}$$

Ans. £3 3s.

$$(3) \begin{array}{r} | \frac{4}{5} | \frac{1}{5} | 499 \text{ at } 5d. \\ | \frac{4}{5} | \frac{1}{5} | \hline 1| \frac{1}{4} | 166 \ 4 \\ | \frac{4}{5} | \frac{1}{5} | \hline 41 \ 7 \\ | \frac{4}{5} | \frac{1}{5} | \hline 2|0) 20|7 \ 11 \end{array}$$

Ans. £10 7s. 11d.

$$(4) \begin{array}{r} | 6 | \frac{1}{2} | 792 \text{ at } 6d. \\ | 6 | \frac{1}{2} | \hline 2|0) 39|6 \end{array}$$

Ans. £19 16s.

$$(5) \begin{array}{r} | 6 | \frac{1}{2} | 888 \text{ at } 9d. \\ | 6 | \frac{1}{2} | \hline 3| \frac{1}{2} | 444 \\ | 6 | \frac{1}{2} | \hline 222 \\ | 6 | \frac{1}{2} | \hline 2|0) 66|6 \end{array}$$

Ans. £33 6s.

PRACTICE.

$$(6) \quad \begin{array}{r} 6\frac{1}{3} \\ \hline 3 \\ 2 \\ \hline 153 \end{array} \begin{array}{l} 921 \text{ at } 11d. \\ 460 \ 6 \\ 230 \ 3 \\ \hline 153 \ 6 \\ \hline 2084 \ 3 \end{array}$$

Ans. £42 4s. 3d.

CASE 3.

$$(2) \quad \begin{array}{r} |3|\frac{1}{4}|487 \text{ at } 15d. \\ |121\ 9 \\ \hline 2|060|8-9 \end{array}$$

$$(3) \quad \begin{array}{r} 6\frac{1}{4} \\ 3\frac{1}{3} \\ 1\frac{1}{3} \\ \hline 4 \end{array} \begin{array}{r} 979 \text{ at } 22\frac{1}{4} \\ 489 \quad 6 \\ 244 \quad 9 \\ 81 \quad 7 \\ \hline 20 \quad 43 \end{array}$$

App. £30 8s. 9d.

2|0)181|5 23

Ans. £90 15s. 2*3*d.

(4)	6	1	532	at 23 <i>d.</i>
	4	1	266	
	1	1	177	4
	1	1	44	4
	1	1	22	2
	4	2	11	1

2|0)105|2 11

Ans. £52 12s. 11d.

CASE 4.

$$(2) \quad 15 \mid \frac{1}{4} \mid 489 \text{ at } 5s.$$

Ans. £122 5s.

$$(3) \quad \left| 10 \right. \left| \frac{1}{2} \right| 937 \text{ at } 11s. \quad \begin{array}{r} 1 \\ 1 \\ \hline 468 \end{array} \quad \begin{array}{r} 10 \\ 46 \\ \hline 17 \end{array}$$

Ans. £515 7s.

$$(4) \quad \left| 10 \right. \left| \frac{1}{2} \right| 1286 \text{ at } 15s. \quad \begin{array}{r} 5 \\ 5 \\ \hline 643 \end{array} \quad \begin{array}{r} 1 \\ 321 \\ \hline 10 \end{array}$$

Ans. £964 10s.

$$(5) \quad \left| 10 \right. \left| \frac{1}{2} \right| 2798 \text{ at } 19s. \quad \begin{array}{r} 5 \\ 4 \\ \hline 1399 \\ 699 \\ \hline 559 \end{array} \quad \begin{array}{r} 10 \\ 12 \\ \hline 12 \end{array}$$

Ans. £2658 2s.

CASE 5.

$$(2) \quad \left| 10 \right. \left| \frac{1}{2} \right| 569 \text{ at } 4 13 \frac{7}{4} \quad (3) \quad \left| 10 \right. \left| \frac{1}{2} \right| 1967 \text{ at } 5 16 \frac{9}{4}$$

		£ s. d.
		4
		2276
2	$\frac{1}{2}$	284 10
1	$\frac{1}{2}$	56 18
6	$\frac{1}{2}$	28 9
1	$\frac{1}{2}$	14 4 6
$\frac{1}{2}$	$\frac{1}{2}$	2 7 5
		1 3 8 $\frac{1}{2}$

Ans. £2663 12 7 $\frac{1}{2}$

$$\left| 10 \right. \left| \frac{1}{2} \right| 9835 \quad \left| 10 \right. \left| \frac{1}{2} \right| 49115 \quad \left| 10 \right. \left| \frac{1}{2} \right| 987$$

		£ s. d.
		5
		9835
5	$\frac{1}{2}$	983 10
1	$\frac{1}{2}$	491 15
6	$\frac{1}{2}$	98 7
3	$\frac{1}{2}$	49 3 6
$\frac{3}{4}$	$\frac{1}{4}$	24 11 9
		6 2 11 $\frac{1}{4}$

Ans. £11488 10 2 $\frac{1}{4}$

PRACTICE.

$$(4) \quad \begin{array}{r|rr} 10 & 1 & 2 \\ \hline 2975 & 27 & 19 \\ 7 & & \end{array}$$

	20825
5	1487 10
4	743 15
8	595
2	99 3 4
1	24 15 10
1	12 7 11
1	6 3 11
4	3 1 11

Ans. £23796 18 0 $\frac{1}{4}$

CASE 6.

$$(2) \quad \begin{array}{r|rrr} C. & qr. & lb. & \mathcal{L} \\ \hline 9 & 2 & 17 & \text{at } 4 \end{array} \quad \begin{array}{r|rrr} s. & d. & & \\ \hline 7 & 6 & (3) & \end{array} \quad \begin{array}{r|rrr} C. & qr. & lb. & \mathcal{L} \\ \hline 11 & 1 & 16 & \text{at } 5 \end{array} \quad \begin{array}{r|rrr} s. & d. & & \\ \hline 6 & 7 & 11 & 11 \\ 9 & & & \end{array}$$

	2	1	39	7	6		1	1	58	12	10
14	1	2	3	9		14	1	1	6	7	
2	1	0	10	11	1	2	1	1	13	3	
1	1	1	1	6	2	9	1	1	10		

Ans. £42 4 6 $\frac{1}{4}$ Ans. £60 14 8

$$(4) \quad \begin{array}{r|rrr} C. & qr. & lb. & \mathcal{L} \\ \hline 7 & 3 & 22 & \text{at } 1 \end{array} \quad \begin{array}{r|rrr} s. & d. & & \\ \hline 18 & 4\frac{3}{4} & (5) & \end{array} \quad \begin{array}{r|rrr} C. & qr. & lb. & \mathcal{L} \\ \hline 27 & 1 & 19 & \text{at } 2 \end{array} \quad \begin{array}{r|rrr} s. & d. & & \\ \hline 17 & 8\frac{1}{4} & 3 \times 9 = & \end{array}$$

	2	1	13	8	9 $\frac{1}{4}$		1	1	8	13	0 $\frac{3}{4}$
1	1	0	19	2	1	14	1	77	17	6 $\frac{3}{4}$	9
14	1	9	7			7	14	14	5		
7	1	4	9	$\frac{1}{4}$		4	1	7	2		
1	1	2	4	$\frac{3}{4}$	4	1	1	2	0		

Ans. £15 5 0 $\frac{3}{4}$ Ans. £79 1 8 $\frac{3}{4}$

TARE AND TRET.

CASE 1.

<i>Cwt. qr. lb.</i>	<i>Cwt. qr. lb.</i>	<i>Cwt. qr. lb.</i>
(2) 7 3 .20	(3) 6 2 5	(4) 369 2 21
8	— 1 11	— 10 1 12
gross 63 1 20	Ans. 6 0 22	Ans. 359 1 9
—5 1 19	—	—
Ans. 58 0 1	—	—

<i>Cwt. qr. lb.</i>	<i>C. qr. lb.</i>	<i>lb.</i>
(5) 5 1 19	(6) No. 1. 3 2 19	tare 34
8	No. 2. 6 0 13	tare 57
—	No. 3. 4 3 5	tare 46
43 1 12 whole gross.	—	—
—2 0 23 tare.	14 2 9 w.t. 137 =	1 0 25
—	—1 0 25	—
Ans. 41 0 17 neat.	—	—
—	Ans. 13 1 12	—

CASE 2.

<i>C. qr. lb.</i>	<i>qr. lbs.</i>
(2) 4 2 24	2 18
7	7
33 0 0 gross.	4 cwt. 2 qrs. 14 lbs. whole tare.
4 2 14 tare.	—
Ans. 28 1 14 neat.	—

TARE AND TRET.

(3) C. qr. lb.
 21 2 21
 3 0 18

Neat 18 2 3 at 5 50
 18

qrs.	lbs.	cts.
2	1	4400.
		550.
		9900.
2	1	275
1	1	9 8+
		4 9

Ans. \$101 89 7

(4) C. qr. lb. lb.
 2 1 25 30 +
 9 9
 22 1 1 gross. 270 = 2 1 18
 2 1 18 tare.

Neat 19 3 11 at 5 10
 19

qrs.	lbs.	cts.
2	1	45 90
		51 0
		96 90
1	1	2 55
7	1	1 27 5
4	1	31 8+
		18 2+

Ans. \$101 22 5 value.

CASE 3.

	C.	qr.	lb.	
(2)	7	3	14	
			4	
lbs.	16	1	31 2 0	gross.
			1	
4	4	2	0	
		1	0 14	
			5 2 14	tare.
Ans.	25	3	14	neat.

	C.	qr.	lb.	
(3)	5	1	13	
			10	
lbs.	16	1	53 2 18	gross.
			1	
7	2	18	+ tare.	
Neat	46	0	0	at \$ 8 75
			46	
			5250	
			3500	
Ans.	\$ 402	50	value.	

TARE AND TRET.

(4) 4C. 1qr. 24lb.

6

16	26	3	4	gross.
2	3	3	8+	
	0	1	25+	

Tare 4 1 5

Neat 22 1 27 = 2519 at $\frac{cts}{lb}$ 74

17633

1259 5

Ans. \$188 92 5 value.

CASE 4.

(2) 2C. 1qr. 10lb.

12

16	28	0	8	gross.
2	4	0	1	
	0	2	0	
	4	2	1	tare.
4	23	2	7	suttle.
	0	3	17	tret.

Neat 22 2 18 at 19 60

22

2	3	39	20
		392	0
lb.		431	20
14	1	9	80
		2	45
2	1	35	
2	1	35	

Ans. \$444 15 value.

TARE AND TRET.

91

(3)	C. qr. lb.			qr. lb.		
	4	1	11		1	5
			6			6
	26	0	10	gross.	ctd.	1
	1	3	2	tare.		3
	24	1	8	suttle.		2 tare.
	0	3	20	tret.		

Neat 23 1 16 at 6 75
 $\underline{\quad}$
 $\frac{1}{4} \times 23 = 23$

qrs.	lbs.	cts.
1	20 25	
	135 0	
	155 25	
14	1 68	
2	84	
	12	

Ans. \$157 90 value.

APPLICATION.

(1)	C. qr. lb.			lbs.	cts.
	17	3	22 gross.		
		3	14 tare.		
	Neat 17	0	8=1912 at 23 $\frac{1}{4}$	23 $\frac{1}{4}$	

Ans. \$444 54

TARE AND TRET.

(2)	5C. 2qr. 19lb. 3×5=15	2qr. 25 3
	17 0 1 5	2 0 19 5
	85 0 5 gross. 10 3 11 tare.	C.10 3 11
	Neat 74 0 22 at \$6 75cts.	

16	1	27 00
	7	472 5
		499 50
4	1	96
2	2	24
		12

Ans. \$500 82 value.

- (3) No. 1. 6 3 18
 No. 2. 7 0 10
 No. 3. 5 3 26
 No. 4. 8 0 3

lbs	1	28 0 1 gross.
8	14	
4	1/2	2 0 0
		1 0 0

3 0 0 tare.

Neat 25 0 1 at \$3 75cts.

25		
		18 75
		75 0
1	1/2	93 75
		3 3

Ans. \$93 78 3 value.

TARE AND TRET.

93

(4) 1C. 1qr. 23lb. 18lb.
 $4 \times 6 = 24$ 24
 $\overline{5 \ 3 \ 8}$ 72
 $\quad \quad 6$ 36 C.qr. lb.
 $\overline{34 \ 3 \ 20}$ gross. 432 = 3 3 12 tare.
 $\overline{3 \ 3 \ 12}$ tare. —

Neat 31 0 8 at \$5 17½cts.
 $\overline{2}$

8	1	1035 halves.
	4	31
		1035
		3105
		32085
		73 9
$2) 32158 \ 9$		

Ans. \$160 79 4 value.

(5) 1C. 1qr. 13lb. 22lb.
 $3 \times 5 = 15$ 15
 $\overline{4 \ 0 \ 11}$ 110
 $\quad \quad 5$ 22 C.qr.lb.
 $\overline{20 \ 1 \ 27}$ gross. 330 = 2 3 22 tare.
 $\overline{2 \ 3 \ 22}$ tare. —

Neat 17 2 5 at \$9 64cts.

17		
2	1	67 48
	4	96 4
lb.		163 88
4	1	4 82
1	1	34 4
		8 6

Ans. \$169 13 0

INTEREST.

(6) C. qr. lb.
 6 2 14
 10

lbs.				
16	1	66	1	0 gross.
2	1	9	1	24
		1	0	20
		10	2	16 tare.
lb.		55	2	12 suttle.
4	2	2	0	15 tret.
				lbs. cts.

Neat 53 1 25 = 5989 at 11 $\frac{1}{2}$
 11 $\frac{1}{2}$

65879
 2994 5

Ans. \$688 73 5 value.

—•@•—

INTEREST.

EXAMPLES IN CASE 1.

(2) \$
 225
 7

Ans. \$15 75

(3) \$ cts.
 384 50
 5

Ans. \$19 22 5 m.

(4) £ 580 10
6

£34 83 0 Ans. 34 16 7
20

s.16 60
12
d.7 20

§ cts.
1654 81
5

§82 74 05 Ans. 82 74
—

(6) | 11 1 | 1500
Ans. § 7 50

(7) £ 350
5 $\frac{1}{4}$

1750
87 10
—
£18 37 10
20

—
s.7 50
12
—
d.6 00

(8) | 524
5 $\frac{1}{4}$
—
2620
131
—

Ans. §27 51

(9) | 842
5 $\frac{1}{4}$
—
4210
421
—

Ans. §46 31

INTEREST.

CASE 2.

(2) $\begin{array}{r} \$ \\ 540 \\ \hline 5 \end{array}$ (3) $\begin{array}{r} £ s. d. \\ 124\ 5\ 6 \\ \hline 4 \end{array}$ $\begin{array}{r} £ s. d. \\ 4\ 19\ 5 \\ \hline 3 \end{array}$ Int. for 1 year.

$\begin{array}{r} 27|00 \\ -20 \\ \hline 2\ 0 \end{array}$ $\begin{array}{r} £4|97\ 2\ 0 \\ -20 \\ \hline \end{array}$ $\begin{array}{r} £14\ 18\ 3 \\ -12 \\ \hline \end{array}$ Ans.

Ans. $\begin{array}{r} \$54|00 \\ -12 \\ \hline \end{array}$ $\begin{array}{r} .19|42 \\ -12 \\ \hline \end{array}$
 $\begin{array}{r} d.5|04 \\ - \\ \hline \end{array}$

(4) $\begin{array}{r} \$ \\ 482 \\ \hline 6 \end{array}$

$\begin{array}{r} 28|92 \\ -7 \\ \hline \end{array}$ interest for 1 year.

Ans. $\begin{array}{r} \$202|44 \\ - \\ \hline \end{array}$

CASE 3.

(2) $\begin{array}{r} \$ \\ 325 \\ \hline 4 \end{array}$

mo.		
2	$\begin{array}{r} \\ \frac{1}{2} \end{array}$	$\begin{array}{r} \\ 13 00 \\ -4 \\ \hline \end{array}$
		Int. for 1 yr.
		$\begin{array}{r} \\ 52 \\ -2 16 6 \\ \hline \end{array}$
		Int. for 4 yrs. Int. for 2 mo.

Ans. $\begin{array}{r} \$54\ 16\ 6 \\ - \\ \hline \end{array}$

INTEREST.

97

(3)	<u>840</u>	\$
	4	
mo.	3 <u>1</u> / ₃	33 <u>60</u>

168|00 Int. for 5 yr.
8|40 Int. for 3 mo.

840 Int. for 3 mo.

Ans. \$176 40

$$(4) \quad \begin{array}{r} 840 \\ - 7 \\ \hline \end{array}$$

294|00 Int. for 5 yrs.
19|60 Int. for 4 mo.

Ans. \$313 60

(6) . 1200
5

Ans. \$60 00 Int. for 1 yr. Then say, as 1yr. : 15w. ::
 \$60 : \$17 30cts. Ans.

$$(7) \quad \begin{array}{c|cc|c} & \frac{1}{2} & \frac{1}{2} & 240 \\ \hline & & & 4^3 \\ & \frac{1}{4} & \frac{1}{2} & 960 \\ & & & 120 \\ & & & 60 \end{array}$$

Ans. \$11 40 Int. for 1 yr. Then say, as 1 yr. : 61d. ::
— \$11 40 : \$1 90cts. Ans.

(8) $\begin{array}{r} \text{£} \\ 1000 \\ - 7 \\ \hline \end{array}$

$\underline{\text{£70 00}}$ Int for 1 yr. Then as 1yr. : 14mo. :: $\underline{\text{£7(}}$
 $\underline{\text{£81 13s. 4d.}}$ Ans.

(9) $\begin{array}{r} \$ \\ 450 \\ - 5\frac{1}{2} \\ \hline \end{array}$

$\underline{\text{2250}}$
 $\underline{\text{225}}$

$\underline{\text{\$24 75}}$ Int. for 1 yr. Then as 1yr. : 6mo. 20d.
 $\underline{\text{\$24 75cts.}}$: $\underline{\text{\$13 75cts. + An}}$

(19) $\begin{array}{r} \$ \text{ cts.} \\ 375 25 \\ - 6 \\ \hline \end{array}$

$\underline{\text{\$22 51 50}}$ Int. for 1 yr. Then as 1yr. : 3yrs. 2mo. 3d.
 $\underline{\text{5d.}}$:: $\underline{\text{\$22 51cts. 5m. : 73 03 + An}}$

CASE 4.

(2) $\begin{array}{r} \$ \\ 854 \\ - 30 \\ \hline \end{array}$

$\underline{\text{6)25620}}$

Ans. $\underline{\text{\$4 27 0}}$

(3) $\begin{array}{r} \$ \\ 1100 \\ - 48 \\ \hline \end{array}$

$\underline{\text{8800}}$

$\underline{\text{4400}}$

$\underline{\text{6)52800}}$

Ans. $\underline{\text{\$8 80 0}}$

(4) \$ 3459
75
17295
24213
6259425

Ans. \$43 23 7

$$\begin{array}{r}
 (5) \quad \begin{array}{r} \$ \\ 1500 \\ - 60, \\ \hline \end{array} \\
 \begin{array}{r} 6) 90000 \\ \hline \end{array} \\
 \begin{array}{r} | 1 \frac{1}{2} | 15000 m. at 6 per cent. \\ - 2500 \end{array}
 \end{array}$$

Ans. \$12 50 0

CASE 5.

(2) 6 yrs.
4 dolls.

**24 Int. of £100 for 6 yrs.
+ 100**

£124 amount of £100 for 6 yrs.

Then as £124 : £1240 :: £100 : 1000. Ans.

(3) 5 yrs.
6 dolls.

30 Int. of \$100 for 5 yrs.
100

§130 amount of §100 for 5 yrs.

Then as \$130 : \$2470 :: \$100 : \$1900. Ans.

CASE 6.

(2) §
 1476 amt.
 1200 prin.

§276 Int.

And \$1200 : \$100 :: \$276 : \$23 int. of \$100 for the same time.

Then as 5 yrs. 9 mo. : \$23 :: 1 yr. : \$4 per cent. Ans.

100

INTEREST.

	\$ cts.
(3)	927 82½ amt.
	834 00 prin.
	<u>§93 82½</u> int.

As §834 : §93 82½ cts. :: §100 : §11 25cts.
 And then, as 2 yrs. 6 mo. : §11 25cts. :: 1 yr. : §4½ per cent.
 Ans.

CASE 7.

	£	£
(2)	1600	2048
	4	1600
	<u>£64 00</u>	: 1 yr. :: <u>448</u> : 7 yrs. Ans.

(3)	\$	4½
	1000	
	<u>40 00</u>	
	<u>5 00</u>	

§45 00 : 1 yr. :: §281 25cts. : 6 yrs. 3 mo. Ans.

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COMPOUND INTEREST.

(2)	\$
	760 prin.
	6 rate per cent.
	<u>45 60</u> int. 1st year.
	805 60 amt. of 1st yr. and prin. for the 2d yr
	48 33 6 int. of 2d yr.
	<u>853 93 6</u> amt. of 2d yr. and prin. for the 3d yr
	51 23 6 int. of 3d yr.
	<u>905 17 2</u> amt. of 3d yr.
	760 00 0 1st prin.

Ans. §145 17 2 compound int.

	<i>£ s. d.</i>	<i>£ s. d.</i>
(3)	242 10 6	242 10 6
	6	14 11 0 int. 1st yr.
	<hr/>	<hr/>
	£14 55 3 0	257 1 6 amt.
	20	15 8 5 $\frac{3}{4}$ int. 2d yr.
	<hr/>	<hr/>
	11 03	272 9 11 $\frac{3}{4}$ amt.
		16 7 0 int. 3d yr.
	<hr/>	<hr/>
	288 16 11 $\frac{3}{4}$	amt.
	17 6 7 $\frac{1}{4}$	int. 4th yr.
	<hr/>	<hr/>
	306 3 7	amt.
	—242 10 6	1st. prin.
	<hr/>	<hr/>
	Ans. 63 13 1+	com. int.
	<hr/>	<hr/>

	<i>\$</i>
(4)	1300
	5
	<hr/>
	65 00 int. 1st yr.
	1300
	<hr/>
	1365 amt.
	5
	<hr/>
	68 25 int. for 2d yr.
	1365
	<hr/>
	1433 25 amt.
	5
	<hr/>
	71 66 2 int. for 3d yr.
	1433 25
	<hr/>
	Ans. \$1504 91 2m. amt.
	<hr/>

(5) $\begin{array}{r} \$ \\ 3127 \\ - 4 \\ \hline \end{array}$

$\begin{array}{r} \$ \\ 3127 \\ - 14071 \\ \hline \end{array}$ 5 int. of the 1st yr.

$\begin{array}{r} 12508 \\ - 15635 \\ \hline \end{array}$

$\begin{array}{r} 326771 \\ - 14747 \\ \hline \end{array}$ 5 amt. 2d yr.

$\begin{array}{r} \$140715 \\ \hline \end{array}$

$\begin{array}{r} 3414762 \\ - 153664 \\ \hline \end{array}$ 2 amt. 3d yr.

$\begin{array}{r} 3568426 \\ - 160579 \\ \hline \end{array}$ 6 amt. 4th yr.

Ans. $\underline{\$3729\ 00\ 5\ \text{amt.}}$

PROMISCUOUS EXAMPLES,

(1) $\begin{array}{r} \$\ cts. \\ 620\ 25 \\ - 5\frac{1}{2} \\ \hline \end{array}$

(2) $\begin{array}{r} £ \\ 420 \\ - 7 \\ \hline \end{array}$

$\begin{array}{r} 310125 \\ - 31012 \\ \hline \end{array}$

$\begin{array}{r} £2940 \\ - 20 \\ \hline \end{array}$

34 11 37 int. for 1 yr.

$\begin{array}{r} .8\ 00 \\ - 5 \\ \hline \end{array}$ Ans. £29 8s.

Ans. $\underline{\$170\ 56\ 8m.}$

(3) $\begin{array}{r} \$ \\ 1450 \\ - 60 \\ \hline \end{array}$

$\begin{array}{r} 6)87000 \\ \hline \end{array}$

14500 mills = $\underline{\$14\ 50cts.}$ Ans.

INTEREST.

103

	<i>£</i>	<i>s.</i>	<i>d.</i>	
(4)	626	5	0	626 5 0
	5 $\frac{1}{4}$			32 17 6 $\frac{3}{4}$ int. of the 1st yr.
	<hr/>			
	3131	5	6 $\frac{3}{4}$ amt.	659 2 6 $\frac{3}{4}$ amt.
	156	11	3	34 12 1 int. of 2d yr.
	<hr/>			
	£32 87	16	3	693 14 7 $\frac{3}{4}$ amt.
	.20			36 8 5 int. of 3d yr.
	<hr/>			
	s.17 56			730 3 0 $\frac{3}{4}$ amt.
	12			—626 5 0 prin.
	<hr/>			
	d.6 75			Ans. £103 18 0 $\frac{3}{4}$ + compound int.
	4			<hr/>
	<hr/>			
	grs.3 00			
	<hr/>			

(5) £
 1659
 4

£66|36
20
—
s.7|20
12
—
d.2|40
4
—
qr.1|60

Int. for 1 yr.

Then as 365 days : 21 days :: £66 7s. 2 $\frac{1}{4}$ d. : £3 16s. 4 $\frac{1}{4}$ d. +
Ans.

104 INSURANCE, COMMISSION AND BROKAGE.

(6)	\$	500
	8	
<hr/>		

\$40 00 int. for 1 yr.

Then as \$40 : \$500 :: 1y. : 12 yrs. 6mo. Ans.

(7) Thus, 6yrs. and 6mo. at 2 per cent. = \$13 interest on \$100.

Then \$13 + \$100 = \$113 = amount of \$100.

And as \$113 : \$250 :: \$100 : \$221 23cts. 9m. Ans.

(8)	£	450 amount.
		300 principal.
<hr/>		

£150 interest.

Then as £300 : £100 :: £150 : £50 which divided by the 5 years = 10 per cent. Ans.

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INSURANCE, COMMISSION AND BROKAGE.

EXAMPLES.

(2)	£	1320
	5	
<hr/>		

Ans. £66|00

(3)	\$	3450
	4½	
<hr/>		

13800

1725

13800

1725

(4)	\$	1680
	2½	
<hr/>		

3360

840

3360

840

Ans. \$155|25cts.

\$46|20 commission.

\$1680 — \$46 20cts. = \$1633|80cts. Ans.

$$(5) \begin{array}{r} £ \\ 760 \\ 6\frac{1}{2} \\ \hline 4560 \\ 380 \\ \hline \end{array}$$

$$\underline{\underline{\text{£49|40 Ans. £49 8s.}}} \\ 20 \\ \underline{\underline{.8|00}}$$

$$(6) \begin{array}{r} \$ \\ \frac{1}{2} | \frac{1}{2} | 5630 \\ | | 7\frac{3}{4} \\ \hline 39410 \\ \frac{1}{4} | \frac{1}{2} | 2815 \\ | | 1407 5 \\ \hline \end{array}$$

$$\underline{\underline{\text{Ans. \$436|32|5m.}}}$$

$$(7) \begin{array}{r} \$ \\ \frac{1}{2} | \frac{1}{2} | 17654 \\ | | 18\frac{3}{4} \\ \hline 141232 \\ 17654 \\ \frac{1}{4} | \frac{1}{2} | 8827 \\ | | 4413 \frac{1}{2} \\ \hline \end{array}$$

$$\underline{\underline{\text{Ans. \$3310|12 \frac{1}{2}}}}$$

$$(8) \begin{array}{r} £ \\ 2150 \\ 2 \\ \hline \end{array}$$

$$\underline{\underline{\text{Ans. £43|00}}}$$

$$(9) \begin{array}{r} \$ cts. \\ \frac{1}{4} | \frac{1}{4} | 984 50 \\ | | 1\frac{1}{4} \\ \hline 984 50 \\ 246 12 \frac{1}{2} \\ \hline \end{array}$$

$$\underline{\underline{\text{Ans. \$12|30|62 \frac{1}{2}}}}$$

$$(10) \begin{array}{r} \$ cts. \\ \frac{1}{2} | \frac{1}{2} | 1650 75 \\ | | 1\frac{1}{2} \\ \hline 1650 75 \\ 825 37 \frac{1}{2} \\ \hline \end{array}$$

$$\underline{\underline{\text{Ans. \$24|76|12 \frac{1}{2}}}}$$

DISCOUNT.

EXAMPLES.

(2) Thus, 2mo. at 6 per cent. per an. = $\$1\frac{1}{2}$ int. of $\$100$
 $\quad \quad \quad + 100$

$\overline{101\frac{1}{2}}$ amt. of do.

Then as $\$101\frac{1}{2} : \$850 :: \$100 : \$837\ 48cts.$ 8m. +
 Ans.

(3) Thus, 9mo. at 6 per cent. per an. = $\$4\frac{1}{2}$ int. of $\$100$
 $\quad \quad \quad 100$

$\overline{104\frac{1}{2}}$ amt. of 100

Then as $\$104\frac{1}{2} : \$645 :: \$100 : \$617\ 22cts.$ 4m.
 present worth. $\quad \quad \quad 645\ 00\ 0$

Ans. $\underline{\underline{\$27\ 77\ 6}}$

Yrs.

(4) $\begin{array}{r} 4 \\ 5 \\ \hline \end{array}$

$\overline{20}$ int. of $\$100$ for 4 yrs.
 $\quad \quad \quad 100$

$\overline{\underline{\$120}}$ amt. of do.

Then as $\$120 : \$775\ 50cts. :: \$100 : \$646\ 25cts.$ Ans.

(5) 8mo. at 6 per cent. per an. = $\$4$ int. of $\$100$
 $\quad \quad \quad 100$

$\overline{\underline{\$104}}$ amt. of do.

Then $\$104 : \$580 :: \$100 : \$557\ 69cts.$ + Ans.

DISCOUNT.

107

(6)	Yrs.
	3
	4 $\frac{1}{2}$
	<hr/>
	12
	1 $\frac{1}{2}$
	<hr/>
	13 $\frac{1}{2}$ int. of 100
	100
	<hr/>
	\$113 $\frac{1}{2}$ amt. of do.

Then as \$113 $\frac{1}{2}$: \$954 :: \$100 : \$840 52cts. 8m. Ans.

(7) Thus, 15 mo. = 1 $\frac{1}{2}$ yr. at 7 per cent. per annum = \$8 $\frac{1}{2}$ the discount of 100.
100

\$108 $\frac{1}{2}$ amt.

Then \$108 $\frac{1}{2}$: \$205 :: \$100 : \$188 50cts. 5m. present worth.
205 00

Ans. \$16 49 5

(8)	mo.	£
	6	1 $\frac{1}{2}$ 5
	3	1 $\frac{1}{2}$ 2 $\frac{1}{2}$
		<hr/>
		3 $\frac{1}{2}$ discount of 100
		100
		<hr/>
		\$103 $\frac{1}{2}$ amt.

Then as \$103 $\frac{1}{2}$: \$775 :: \$100 : \$746 98cts. 7m. Ans.

DISCOUNT.

(9)	mo.	\$
	6	$\frac{1}{2}$ 6
	3	$\frac{1}{2}$ 3
	1	$1\frac{1}{3}$

5 dis. of 100 for 10mo. 7½ dis. of 100 for 15 mo.

\$105 amt.

Again | 3 | $\frac{1}{4}$ | 6

11

15 mo.

1071

§
1005
—475

Then as $105 : 475 :: 100 : 452$ 38. Ans. to first part.
Again. $1074 : 530 :: 100 : 493$ 02 4

Ans. \$945 40 2m.

(10) 2260
6

135 60 int. for 1 yr.
5

Again § 65

30 dis. of 100
100

\$678 00 int. for 5 yrs.

\$130 amt.

Then \$130 : \$2260 :: \$100 : \$1738 46cts. 2m. pres. wr.
 2260 00 0

521 53 8 discount.
678 00 0 interest.

Ans. § 156 46 2

EQUATION.

109

$$(12) \quad \begin{array}{r} \mathcal{L} \\ 782 \\ \times 4 \\ \hline \end{array}$$

$$\underline{\mathcal{L}31|28} \\ 20$$

$$\begin{array}{r} s.5|60 \\ -12 \\ \hline d.7|20 \end{array}$$

$$(13) \quad \begin{array}{r} \$ \\ 476 \\ \times 3 \\ \hline \end{array}$$

$$\underline{\text{Ans. } \$14|28\text{cts.}}$$

$$\begin{array}{r} \underline{s.31|5s.} \\ 7d. \end{array}$$

$$(14) \quad \begin{array}{r} \$ \\ 1385 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 83\ 10\ \text{dis.} \\ \underline{1385\ 00} \end{array}$$

$$\begin{array}{r} \underline{\text{Ans. } \$1301\ 90\text{cts.}} \end{array}$$

$$(15) \quad \begin{array}{r} \$ \\ 650 \\ \times 4\frac{1}{2} \\ \hline \end{array}$$

$$\begin{array}{r} 2800 \\ -325 \\ \hline \end{array}$$

$$\begin{array}{r} 29|25\ \text{discount.} \\ \underline{650|00} \end{array}$$

$$\begin{array}{r} \underline{\text{Ans. } \$620|75} \end{array}$$

.....

EQUATION.

EXAMPLES.

$$(2) \quad \begin{array}{r} \$ \\ 250 \times 6 = 1500 \\ 250 \times 8 = 2000 \\ \hline \end{array}$$

$$\begin{array}{r} 500 \\ \hline 3500 \end{array} \quad \begin{array}{r} \underline{500} \\ \underline{3500} \end{array} \div 500 = 7\text{mo.} \quad \text{Ans.}$$

$$(3) \quad \begin{array}{r} \text{£} \\ 100 \times 2 = 200 \\ 100 \times 4 = 400 \\ 100 \times 6 = 600 \\ \hline 300 \end{array} \quad \begin{array}{r} 1200 \div 300 = 4 \text{ mo. Ans.} \\ \hline \end{array}$$

$$(4) \quad \begin{array}{r} \$ \\ 100 \times 3 = 300 \\ 200 \times 5 = 1000 \\ 250 \times 8 = 2000 \\ \hline 550 \end{array} \quad \begin{array}{r} 3300 \div 550 = 6 \text{ mo. Ans.} \\ \hline \end{array}$$

•••••

BARTER.

EXAMPLES.

- (1) Thus $2\text{cwt. } 2\text{qrs. } 13\text{lbs.} = 293\text{lbs.} \times 9\text{cts.} = 2637\text{cts.}$
Then as $25\text{cts.} : 2637\text{cts.} :: 1\text{lb.} : 105\text{lbs. } 7\frac{7}{9}\text{oz. Ans.}$
- (2) Thus $2500\text{lbs.} \times 4\frac{1}{2}\text{cts.} = \$112\ 50\text{cts.}$
Then as $\$1\ 30\text{cts.} : \$112\ 50\text{cts.} :: 1\text{lb.} : 86\text{lbs. } 8\text{oz.} +$
Ans.
- (3) Thus $108\text{lbs.} \times \$1\ 25\text{cts.} = \$135\ 00\text{cts.}$
Then as $8\frac{3}{4}\text{cts.} : \$135\ 00\text{cts.} :: 1\text{lb.} : 1542\text{lb. } 13\text{oz.} +$
Ans.
- (4) First, as $1\text{cwt.} : \$3\ 75\text{cts.} :: 14\text{cwt. } 3\text{qrs. } 26\text{lbs.} : \56
 $18\text{cts. } 3\text{m.}$ the value of the rice.
Then as $\$1\ 87\frac{1}{2}\text{cts.} : \$56\ 18\text{cts. } 3\text{m.} :: 1\text{lb.} : 29\text{lbs. } 15\text{oz.} +$
Ans.
- (5) Thus $2\text{cwt. } 3\text{qrs. } 17\text{lbs.} = 325\text{lbs.} \times 12\frac{1}{2}\text{cts.} = \$40\ 62\frac{1}{2}\text{cts.}$
Then as $37\text{cts.} : \$40\ 62\frac{1}{2}\text{cts.} :: 1\text{yd.} : 109\text{yds. } 3\text{qrs.}$
Ans.
- (6) Thus $357\text{bu.} \times 93\text{cts.} = \$332\ 01\text{ct.}$
Then $45\text{cts.} : \$332\ 01\text{ct.} :: 1\text{bu.} : 737\text{bu. } 3\text{pe} +$
Ans.

(7) Thus $15\text{cwt. } 0\text{qr. } 27\text{lbs.} = 1707\text{lbs.} \times 20\text{cts.} = \341
 40cts.

Then $\$9\ 50\text{cts.} : \$341\ 40\text{cts.} :: 1\text{cwt.} : 35\text{cwt. } 3\text{qrs.}$
 $20\text{lbs.} + \text{Ans.}$

(8) Thus $95\text{yds.} \times 5\text{pie.} = 475\text{yds.} \times 23\text{cts.} = \$109\ 25\text{cts.}$
And $32\text{ sheep} \times 250 =$

$\$29\ 25\text{ rem.}$

Then as $\$1\ 50\text{cts.} : \$29\ 25\text{cts.} :: 1\text{cwt.} : 19\text{cwt. } 2\text{qrs.}$
Ans.

(9) Thus $1286\text{yds. at } 43\text{cts. per yd.} = \$552\ 98\text{cts.}$
And $2\text{cwt. } 1\text{qr. } 13\text{lbs.} = 265\text{lbs.} \times 14\text{cts.} = 37\ 10 -$

$\text{Ans. } \$515\ 88$

(10) Thus $570\text{lbs.} \times 7\text{cts.} = \$39\ 90\text{cts.}$

Then as $11\frac{1}{2}\text{cts.} : \$39\ 90\text{cts.} :: 1\text{lb.} : 346\text{lbs. } 15\text{oz.} +$
Ans.

(11) Thus $112\text{cwt.} \times \$5\ 04\text{cts.} = \$564\ 60\text{cts.}$

Then as $1208\text{yds.} : \$564\ 60\text{cts.} :: 1\text{yd.} : 46\text{cts. } 7\text{m.} +$
Ans.

(12) Thus $750\text{lbs.} \times \$1\ 08\text{cts.} = \$810\ 00\text{cts.}$

Then $8\text{cts.} : \$810\ 00\text{cts.} :: 1\text{lb.} : 10125\text{lbs.} = 90\text{cwt.}$
 $1\text{qr. } 17\text{lbs.} \text{ Ans.}$

(13) Thus $2\text{hds.} = 126\text{gals.} \times 75\text{cts.} = \$94\ 50\text{cts.}$

Then $56\text{yds.} : \$94\ 50\text{cts.} :: 1\text{yd.} : \$1\ 68\frac{3}{4}\text{cts.} \text{ Ans.}$

(14) Thus $2108\text{lbs.} \times 10\text{cts.} = \$210\ 80\text{cts.}$

And $31\text{doz.} \times 11\frac{1}{2}\text{cts.} = +3\ 56\frac{1}{2}$

$\$214\ 36\frac{1}{2} \text{ amt. of the whole.}$
 $-135\ 25$

$\$79\ 11\frac{1}{2} \text{ rem.}$

Then as $\$1\ 58\text{cts.} : \$79\ 11\frac{1}{2}\text{cts.} :: 1\text{bar.} : 50\frac{1}{2}\text{bar.}$
Ans.

(15) Thus $17\text{cwt.} \times 4 \times 28 = 1904\text{lb.} \times 13\frac{1}{2}\text{cts.} = \$257\ 04\text{cts.}$
value of A.'s goods.

And 1200lb. at the rate of $\$14$ per cwt. $= 150\ 00$
balance of B.'s goods.

Ans. A. is to receive $\$107\ 04$

(16) Thus 25cts.

-20

5 gain on 20cts.

Then as $5\text{cts.} : 20\text{cts.} :: 5\text{cts.} : 20\text{cts.}$ Ans.

(17) Thus $50\text{cts.} : 56\text{cts.} :: 31\frac{1}{2}\text{cts.} : 35\text{cts.}$ Ans.

(18) Thus 105 tons at $\$10\ 03$ per ton $= \$1053\ 15\text{cts.}$
value of the iron.

pays cash	$650\ 00$
250lb. at 20cts. per lb. =	$50\ 00$
10 loads $\times 15\text{bu.} \times 45\text{cts.} =$	$67\ 50$

And 85gals. at the rate of $\$75$ per hhd. $= 101\ 19$

<u>$-868\ 69$</u>
<u>$1053\ 15$</u>

Rem. unpaid $\$184\ 46$

Then $30\text{cts.} : \$184\ 46\text{cts.} :: 1\text{lb.} : 615\text{lb.}$ nearly.
Ans.

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LOSS AND GAIN.

EXAMPLES.

(2) Thus 10cts.

-8

2

Then $1\text{lb.} : 1763\text{lb.} :: 2\text{cts.} : \$35\ 26\text{cts.}$ Ans.

$$(3) \quad \begin{array}{r} \text{Thus } \$5\ 25cts. \\ -5\ 00 \\ \hline \end{array}$$

25 gained per barrel.

$$\text{Then } 1\text{bar.} : 363\text{bar.} :: 25\text{cts.} : \$90\ 75\text{cts.} \text{ Ans.}$$

$$(4) \quad \begin{array}{r} \text{Thus } \$3\ 90cts. \\ -3\ 75 \\ \hline \end{array}$$

15 gained per yard.

$$\text{Then } 1\text{yd.} : 150\text{yds.} :: 15\text{cts.} : \$22\ 50\text{cts.} \text{ Ans.}$$

$$(5) \quad \text{First, } 1\text{cwt.} : \$7\ 50\text{cts.} :: 18\text{cwt. } 2\text{qrs.} : \$138\ 75\text{cts.} \\ \text{the cost.}$$

$$\text{Then } 1\text{cwt.} : \$7\ 75\text{cts.} :: 18\text{cwt. } 2\text{qrs.} : \$143\ 37\frac{1}{2}\text{cts.} \\ \text{sold for.}$$

Ans. gained $\$4\ 62\frac{1}{2}$

$$(6) \quad \text{First, } 210 \text{ reams} \times \$2\ 62\frac{1}{2} = \$551\ 25\text{cts. the cost.} \\ \text{And } 210 \text{ reams} \times \$2\ 87\frac{1}{2} = \$603\ 75\text{cts. sold for.}$$

Ans. $\$52\ 50$ gained.

$$(7) \quad \begin{array}{r} \text{Thus, sold for } \$20\ 75\text{cts.} \\ \text{cost } 18\ 12\frac{1}{2} \\ \hline \end{array}$$

gained $\$2\ 62\frac{1}{2}$ Ans.

$$(8) \quad \begin{array}{r} \text{First, } 50\text{cts.} \\ -45 \\ \hline \end{array}$$

5

$$\text{Then } 1\text{bu.} : 150\text{bu.} :: 5\text{cts.} : \$7\ 50\text{cts.} \text{ 1st Ans.} \\ \text{Again, } 50\text{cts.} : 5\text{cts.} :: \$100 : \$10. \text{ 2d Ans.}$$

(9) First, $760\text{ lbs.} \times 90\text{cts.} = \$684\ 00$ sold for.
 $\underline{\quad}$
 $\quad\quad\quad\$10\ 00$ cost.

Lost 126 00 1st Ans.

Then $\$100 : \$126 :: \$100 : \$15\frac{1}{2}$. Ans.

(10) First, $37\frac{1}{2}\text{cts.}$
 $\underline{\quad\quad\quad 32}$

5\frac{1}{2}

Then $37\frac{1}{2}\text{cts.} : 5\frac{1}{2}\text{cts.} :: \$100 : \$14\frac{1}{2}$ per cent. Ans.

(11) Thus $1s. : 2d. :: £100 : £16\frac{1}{2}$ per cent. Ans.

(12) Thus $\$13\ 75\text{cts.}$ First cost of each piece.
 $\underline{\quad\quad\quad 3\ 12\frac{1}{2}}$ for dyeing.

$\$16\ 87\frac{1}{2}$ whole cost.

Then $\$100 : \$112 :: \$16\ 87\frac{1}{2}\text{cts.} : \$18\ 90\text{cts.}$ Ans.

(13) Thus $1\text{cwt.} : 1\text{lb.} :: \$7 + \$3 : 8\text{cts. 9m.}$ Ans.

(14) Thus, paid 23cts. per $lb.$
 Sold it for 19

Lost 4cts. per $lb.$

Then as $1\text{lb.} : 702\text{lbs.} :: 4\text{cts.} : \$2\ 08\text{cts.}$ Ans.

(15) Thus $\$2\ 23\text{cts.} : \$2\ 75\text{cts.} :: \$110 : \$135\ 65\text{cts.}$
 And $\$135\ 65\text{cts.} - \$100 = \$35\ 65\text{cts.} = 35\frac{1}{2}$ nearly.
 Ans.

(16) Thus $\$100 : \$125 :: \$2\ 10\text{cts.} : \$2\ 62\frac{1}{2}\text{cts.}$ what
 1 box sold for.
 Then as $\$3\ 50\text{cts.}$ price of $1\text{cwt.} : \$2\ 62\frac{1}{2}\text{cts.}$ price
 of 1 box :: $112\text{lbs.} : 84\text{lbs.}$ Ans.

(17) First, $16\text{ pie.} \times \$14 = \224 the prime cost.
 And $5\text{ pie.} \times \$17 = \85
 $6\text{ pie.} \times \$15 = \90

\$175 received back again.

Then as $\$100 : \$112 :: \$224 : \250 88cts. price of the whole with rate per cent. added.—175 00

5)75 88 price of the
5 pieces.
Ans. \$15 17 6 per pie.

(18) Thus $\$500 - \$410 = \$90$ gain on the whole.
 Then as $372\text{ lbs.} : 1\text{ lb.} :: \$90 : 24\text{ cts.}$ 1m.+ Ans.

(19) Thus $\$1 : \$100 :: 5\text{ cts.} : \$5 00$ the Ans.

(20) First, $\$1 05\text{ cts.} \times 510 = \$535 50\text{ cts.}$ prime cost.
 And $\$1 30\text{ cts.} \times 510 = \$663 00\text{ cts.}$ sold for.

mo.	\$
3 1/4	6
	—
	1 50
	100 00
	—
	\$101 50

Then $\$101 50\text{ cts.} : \$100 :: \$663 : \$653 20\text{ cts.}$ +
 Hence $\$653 20\text{ cts.} - \$535 50\text{ cts.} = \$117 70\text{ cts.}$ Ans.

FELLOWSHIP.

EXAMPLES.

CASE 1.

(2)	Thus D.'s stock	\$500
	E.'s	400
	F.'s	300
	Sum	<u>1200</u>

Then as $1200 : 500 :: 300 : 125$ = D.'s } Ans.
 And $1200 : 400 :: 300 : 100$ = E.'s } Ans.
 And $1200 : 300 :: 300 : 75$ = F.'s }

(3)	Thus A.	\$1200
	B.	500
	C.	700

Whole debt \$2400

Then as $2400 : 1200 :: 1800 : 900$ A.'s } Ans.
 as $2400 : 500 :: 1800 : 375$ B.'s } Ans.
 as $2400 : 700 :: 1800 : 525$ C.'s }

\$1800 proof.

(4)	Thus A. had 50 cattle.
	B. 80
	C. 70

Sum 200

cattle. cattle. \$ \$
 Then as $200 : 50 :: 60 : 15$ A.'s } Ans.
 as $200 : 80 :: 60 : 24$ B.'s } Ans.
 as $200 : 70 :: 60 : 21$ C.'s }

\$60 proof.

(5) Thus, to A. $\frac{\$}{120}$
 B. $\frac{250}{75}$
 C. $\frac{300}{}$
 D. $\frac{208}{25}$

Sum $\underline{\underline{879\ 00}}$

Then As $\$879 : \$650 \left\{ \begin{array}{l} :: 120 : 88\ 73+ = A.'s\ sh. \\ :: 250\ 75 : 185\ 42+ = B.'s\ sh. \\ :: 300 : 221\ 84+ = C.'s\ sh. \\ :: 208\ 25 : 153\ 99+ = D.'s\ sh. \end{array} \right\}$ Ans.

(6) Thus A. is to have 1 portion.

B.	2
C.	6

$\underline{\underline{9}}$ sum of the portions.

Then as $\left\{ \begin{array}{l} p. \quad p. \quad \$ \quad \$ \\ 9 : 1 :: 900 : 100 = A.'s\ share. \\ 9 : 2 :: 900 : 200 = B.'s\ share. \\ 9 : 6 :: 900 : 600 = C.'s\ share. \end{array} \right\}$ Ans.

(7) Thus, he owes to A. $\frac{\$}{250\ 50}$
 B. $\frac{500}{00}$
 C. $\frac{349}{50}$

Sum $\underline{\underline{1100\ 00}}$

Then As $1100 : 960 :: \left\{ \begin{array}{l} \$ \ cts. \quad \$ \ cts. \ m. \\ 250\ 50 : 218\ 58\ 1+A.'s \\ 500\ 00 : 436\ 36\ 3+B.'s \\ 349\ 50 : 305\ 01\ 8+C.'s \end{array} \right\}$ Ans.

EXAMPLES.

CASE 2.

$$(1) \quad \text{Thus } \begin{array}{r} 88 \\ \times 3 \\ \hline 264 \end{array}$$

Sum of stocks and time 2544

Then as $\$2544 : \{ 264 : 184 : 19\ 09\ 4=L.\text{'s}$
 $480 : 184 : 34\ 71\ 6=M.\text{'s}$
 $1800 : 184 : 130\ 18\ 8=N.\text{'s} \} \text{ Ans.}$

$(2) \begin{array}{r} \$ \quad m. \quad \$ \\ 580 \times 3 = 1740 \\ +100 \\ \hline 680 \times 9 = 6120 \\ \hline A.'s \text{ product } 7860 \end{array}$	$\begin{array}{r} \$ \quad m. \quad \$ \\ 480 \times 3 = 1440 \\ -300 \\ \hline 180 \times 2 = 360 \\ +500 \\ \hline 680 \times 3 = 2040 \\ -400 \\ \hline 280 \times 1 = 280 \\ +1000 \\ \hline 1280 \times 3 = 3840 \\ \hline C.'s \text{ product } 7960 \end{array}$
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Then as #28420 : { 7860 :: 2108 44 : 583 12 2+A's
 12600 :: 2108 44 : 984 76 9+B's
 7960 :: 2108 44 : 590 53 7+C's } Ans.

EXCHANGE.

DOMESTIC EXCHANGE.

- (1) Thus, £63 14s. 6d.=15294d. ÷ 72d. a dollar in Virginia= \$212 41 $\frac{1}{2}$ cts. Ans.
- (2) Thus, £230 10s. 7d.=55327d. ÷ 96d. a dollar in New-York and N. Carolina= \$576 32cts. 2m, Ans.
- (3) Thus, \$150
 90d.=a doll. Penn. cur.
 $12)13500d.$
 $\underline{\underline{2|0)112|5}}$
 $\underline{\underline{\text{£}56\ 5s. \ Ans.}}$
- (4) Thus, \$377 40cts.
 72d.=a doll. Mass. cur.
 $754\ 80$
 $26418\ 0$
 $\underline{\underline{12)27172\ 80}}$
 $\underline{\underline{2|0)226|4\ 4d.}}$
 $\underline{\underline{\text{£}113,\ 4s.\ 4d.\ Ans.}}$
- (5) Thus, \$389 45cts.
 56d.=a doll. in Georgia.
 $\underline{\underline{239670}}$
 $\underline{\underline{194725}}$
 $\underline{\underline{12)21809|20}}$
 $\underline{\underline{2|0)181|7\ 5}}$
 $\underline{\underline{\text{£}90\ 17s.\ 5d.}}$

FOREIGN EXCHANGE.

EXAMPLES.

- (2) Thus £1 : £76 :: \$4 10cts. = £1 Irish : \$311 60cts.
Ans.
- (3) Thus \$1 24cts. = 1 milrea : \$532 33cts. :: 1m. : 429m. 298reas. + Ans.
- (4) Thus 66cts. : \$1869 :: 1ru. : 2831 $\frac{9}{11}$ ru. Ans.
- (5) Thus 1g. : 165g. :: 39cts. : \$64 35cts. Ans.
- (6) Thus 33cts. 5m. = 1m. b. : \$280 58cts. 5m. :: 1m. b. : 837 $\frac{3}{8}$ m. b. Ans.
- (7) Thus 1li. : 562li. :: 18cts. 5m. = 1li. : \$103 97cts.
Ans.
- (8) Thus 10cts. = 1*trial plate* : \$463 :: 1*trial* : 4630*rials*.
Ans.
- (9) Thus 1*flo.* : 40cts. :: 591*flo.* 17*st.* : \$236 74cts.
Or 1*st.* : 2cts. :: 591*flo.* 17*st.* : \$236 74cts.
Then \$100 : \$160 :: \$236 74cts. : \$378 78cts. +
Ans.
- (10) Thus as 100*cr.* + 25 : 100*b.* :: 2464*m. b.* : 1971*m. b.*
3*sch.* 2 $\frac{1}{2}$ *pen.* Ans.
- (11) Thus 1*cr.* : 32 $\frac{1}{2}$ *d.* :: 2000*cr.* : £270 16*s.* 8*d.* Ans.
- (12) Thus as 1*pi.* = 8*ri.* : 36*d.* :: \$1676 6*ri.* = 16766*ri.*
: £314 7*s.* 3*d.* Ans.
- (13) Thus 1*pez.* = 20*sol.* : 54*d.* :: 3940*pez.* 15*sol.* : £886
13*s.* 4 $\frac{1}{2}$ *d.* Ans.
- (14) Thus 1*ru.* : 4*s.* 3*d.* :: 2586*ru.* : £549 10*s.* 6*d.* Ans.
- (15) First £1 : £450 15*s.* :: 34*s.* 6*d.* 186610 $\frac{1}{2}$ *pence.*
Or 20*s.* : 9015*s.* :: 414*d.* : 186610 $\frac{1}{2}$ *pence Flemish,*
or groots.
Then 50*st.* = 100*d.* : 186610 $\frac{1}{2}$ *d.* :: 1*ru.* : 1866*ru.* 10 $\frac{1}{3}$ *cop.* Ans.
- (16) Thus as £108 6*s.* 8*d.* Irish : £100*str.* :: £813 3*s.*
6*d.* : £750 12*s.* 6*d.* Sterling. Ans.

- (17) First 20s. : 33s. 6d. :: 5s. : 8s. $4\frac{1}{2}$ d.
Then 5s. : 8s. $4\frac{1}{2}$ d. :: $32\frac{1}{2}$ d. : $54\frac{7}{16}$ d. Flemish. Ans.
- (18) Thus $32\frac{1}{2}$ d. : $54\frac{7}{16}$ d. :: 5s. : 8s. $4\frac{1}{2}$ d.
Then as 5s. : 8s. $4\frac{1}{2}$ d. :: 20s. : 33s. 6d. Ans.
- (19) Thus $\begin{array}{r} s. \quad s. \quad d. \\ 5 | 4 | 33 \quad 6 \\ \hline \end{array}$
 $8 \quad 4\frac{1}{2}$ =value of a crown at that rate.
Then 8s. $4\frac{1}{2}$ d. : 5s. :: $54\frac{7}{16}$ d. : $32\frac{1}{2}$ d. Ans.
- (20) Thus $32\frac{1}{2}$ d. : 32d. :: 36s. 6d. : $36\frac{2}{3}$ d. Ans.
- (21) Thus $51\frac{1}{2}$ d. : 53d. :: 42d. : $43\frac{1}{2}$ d. Ans.

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VULGAR FRACTIONS.

REDUCTION OF VULGAR FRACTIONS.

EXAMPLES.

CASE 1.

(2) Numer. $108)144(1$
 $\overline{108}$

Common measure $36)108(3$
 $\overline{108}$

Then $36)1\frac{1}{4}\frac{3}{4}=3$. Ans.

(4) Numer. $126)234(1$
 $\overline{126}$

$108)126(1$
 $\overline{108}$

Common measure $18)108(6$
 $\overline{108}$

Then $18)1\frac{1}{2}\frac{3}{4}=7$. Ans.

VULGAR FRACTIONS.

CASE 2.

$$(2) \quad 45 \times 3 + 2 = 137. \text{ Ans.}$$

$$(3) \quad \text{Thus } 1564 \times 5 + 3 = 7823. \text{ Ans.}$$

CASE 3.

$$(2) \quad \text{Thus } 67 \div 7 = 9\frac{4}{7}. \text{ Ans.}$$

$$(3) \quad \text{Thus } 16)384(22\frac{3}{32}. \text{ Ans.}$$

$$\begin{array}{r} 44 \\ 32 \\ \hline 12 \end{array}$$

CASE 4.

$$(2) \quad \text{Thus } 6 \times 8 \times 11 \times 13 = 6864 \text{ numer.} = \frac{6864}{12852} \text{ denom. Ans.}$$

$$\text{And } 7 \times 9 \times 12 \times 17 = 12852$$

$$(3) \quad \text{Thus } 7 \times 15 \times 8 \times 6 = 5040 \text{ numer.} = \frac{5040}{32604} \text{ denom. Ans.}$$

$$\text{And } 12 \times 19 \times 11 \times 13 = 32604$$

CASE 5.

$$(2) \quad \text{Thus } 5)5 \ 20 \ 10 \ 15 \text{ the denominators.}$$

$$\begin{array}{r} 1 \ 4 \ 2 \ 3 \\ \hline 1 \ 2 \ 1 \ 3 \end{array}$$

$$\text{Then } 5 \times 2 \times 1 \times 2 \times 1 \times 3 = 60 \text{ common denom.}$$

$$\text{Then the com. denom. } \left. \begin{array}{l} 60 \div 5 = 12 \times 4 = 48 \\ 60 \div 20 = 3 \times 9 = 27 \\ 60 \div 10 = 6 \times 7 = 42 \\ 60 \div 15 = 4 \times 4 = 16 \end{array} \right\} \text{ numer.}$$

$$\text{That is } \frac{48}{60} \frac{27}{60} \frac{42}{60} \frac{16}{60} \text{ Ans.}$$

- (3) Thus $2 \times 10 = 20$ the denom.

$$\begin{array}{r} 5 \\ 1 \\ 9 \end{array}$$

Then $2 \times 5 \times 1 \times 9 = 90$ common denom.

$$\left. \begin{array}{l} 90 \div 10 = 9 \\ 90 \div 2 = 45 \\ 90 \div 9 = 10 \end{array} \right\} \text{numer.}$$

That is $\frac{1}{90}, \frac{4}{90}, \frac{5}{90}$. Ans.

CASE 6.

- (2) First 1 lb. troy = 240 dwt. therefore $\frac{1}{2}$ of $\frac{1}{240} = \frac{1}{480}$ = $\frac{1}{480}$ lb. Ans.
- (3) Thus $3 \times 1 \times 1 = \frac{3}{1}$. And $8 \times 4 \times 4 = \frac{3}{4}$. Ans.
- (4) Thus 1 hhd. = 504 pts. therefore $\frac{1}{2}$ of $\frac{1}{504} = \frac{1}{1008}$ hhd. Ans.

CASE 7.

- (2) Thus $2 \times 112 = 224$ the numer. and $252 \times 1 = 252$ the denom. = $\frac{224}{252} = \frac{8}{9}$ lb. Ans.
- (3) $\frac{8}{9}$ of £1 = $\frac{8}{9}$ of $\frac{100}{1}$ = $\frac{800}{9} = \frac{88}{9}d$. Ans.

CASE 8.

- (2) Thus $\frac{1}{4}$ of a shilling = $\frac{1}{4}$ of $\frac{1}{12} = \frac{1}{48} = 10\frac{1}{2}d$. Ans.
- (3) Thus $\frac{1}{4}$ of a day = $\frac{1}{4}$ of $\frac{24}{1} = \frac{24}{4} = 6$ hrs. Ans.
- (4) Thus $\frac{1}{5}$ of an acre = $\frac{1}{5}$ of $\frac{1}{16} = \frac{1}{80}$ perches = 1 r. 10 p. Ans.

CASE 9.

- (2) Thus 5s. 4d. = 64 d. and £1 = 240 d. therefore $\frac{64}{240} = \frac{4}{15}$ £. Ans.

- (3) Thus $6mo. 2w.=26w.$ and $1yr.=52w.$ therefore $\frac{26}{52}$ of $1yr.=\frac{1}{2}yr.$ Ans.
- (4) Thus $2qrs. 3na.=11na.$ and $1yd.=16na.$ therefore $\frac{11}{16}yd.$ is the Ans.

ADDITION OF VULGAR FRACTIONS.

EXAMPLES.

- (2) Thus $\frac{3}{5} + \frac{4}{5} + \frac{5}{5} + \frac{1}{5} = \frac{13}{5} = 1\frac{3}{5}$ Ans.
- (3) Thus $\frac{4}{7} + \frac{3}{7} + \frac{6}{7} = \frac{13}{7} = 1\frac{6}{7}$ Ans.
- (4) Thus $5)5\ 10$

$\underline{1\ 2=10}$ common denom.

And $10 \div 5 \times 2 = 4$ } numer.

$10 \div 10 \times 5 = 5$ }

Whence $\frac{4}{10} + \frac{5}{10} = \frac{9}{10}$ Ans.

- (5) Thus $3\frac{1}{4} = \frac{13}{4}$, $8\frac{2}{7} = \frac{58}{7}$, and $4 \times 7 \times 9 = 252$ common denom.
 And $252 \div 4 \times 13 = 819$ }
 $252 \div 7 \times 58 = 2088$ } numer.
 $252 \div 9 \times 4 = 112$
 Whence $\frac{819}{252} + \frac{2088}{252} + \frac{112}{252} = \frac{3019}{252} = 11\frac{247}{252}$. Ans.
- (6) Thus $\frac{3}{8}$ of $\frac{6}{5} = \frac{15}{40} = \frac{3}{8}$, and $\frac{3}{4}$ of $\frac{7}{12} = \frac{14}{48} = \frac{7}{24}$.
 Then $8)16\ 24$

$\underline{2\ 3=48}$ common denom.

And $48 \div 16 \times 5 = 15$ } numer.

$48 \div 24 \times 7 = 14$ }

Whence $\frac{15}{48} + \frac{14}{48} = \frac{29}{48}$. Ans.

- (7) Thus $\frac{1}{7}$ of $\frac{4}{5}$ of $\frac{40}{1} = \frac{160}{35} = 53\frac{1}{3}per.$ = 1r. $13\frac{1}{3}p.$
 And $\frac{7}{16}$ of $\frac{40}{1} = \frac{280}{16} = 28p.$
 Whence 1R. $13\frac{1}{3}p.$

$\underline{0\ 28}$

Ans. $2\ 1\frac{1}{3}$

MULTIPLICATION OF VULGAR FRACTIONS.

EXAMPLES.

$$(2) \frac{2}{10} \text{ by } \frac{1}{3} \text{ thus } 2 \times \frac{1}{3} = \frac{2}{3} \\ 10 \times 3 = 30 \quad \text{Ans.}$$

$$(3) \text{ Thus } 6\frac{2}{4} = \frac{26}{4} \text{ by } \frac{1}{7} = \frac{26}{4} \times \frac{1}{7} = \frac{26}{28} = \frac{13}{14}. \quad \text{Ans.}$$

$$(4) 4\frac{3}{4} = \frac{19}{4} \text{ by } \frac{2}{3} = \frac{19}{4} \times \frac{2}{3} = \frac{38}{12} = 3\frac{2}{12} = 3\frac{1}{6}. \quad \text{Ans.}$$

SUBTRACTION OF VULGAR FRACTIONS.

EXAMPLES.

$$(2) \text{ Thus } \frac{1}{4} \text{ of } \frac{1}{4} = \frac{1}{16}, \text{ whence } \frac{1}{20} - \frac{1}{16} \\ 4) 20 \quad 28$$

$$\begin{array}{r} 5 \quad 7 = 140 \text{ common denom.} \\ 140 \div 20 \times 19 = 133 \quad \text{numer.} \\ 140 \div 28 \times 1 = 5 \\ \text{Whence } \frac{133}{140} - \frac{5}{140} = \frac{128}{140} = \frac{32}{35}. \quad \text{Ans.} \end{array}$$

$$(3) \text{ Thus } 1 \times 14 = 14 \text{ common denom.} \\ \text{And } 14 \div 1 \times 5 = 70 \quad \text{numer.} \\ 14 \div 14 \times 8 = 8 \\ \text{Whence } \frac{70}{14} - \frac{8}{14} = \frac{62}{14} = 4\frac{3}{7}. \quad \text{Ans.}$$

$$(4) \text{ Thus } \frac{2}{5} \text{ of a league} = \frac{2}{5} \text{ of 3 miles} = 2 \text{ miles.} \\ \text{And } \frac{1}{10} \text{ of a mile} = \frac{1}{10} \text{ of 8 furlongs} = \frac{8}{10} = \frac{4}{5} \text{ furlongs} \\ = 5 \text{ furlongs } 24 \text{ poles.} \\ \text{Therefore } 2m. - 5fur. 24po. = 1m. 2fur. 16po. \quad \text{Ans.}$$

$$(5) \text{ Thus } 5\frac{3}{4} = \frac{23}{4} \text{ and } 2\frac{2}{3} = \frac{8}{3} \text{ therefore } 4 \times 3 = 12 \text{ com. d.} \\ \text{And } 12 \div 4 \times 23 = 69 \quad \text{numer.} \\ 12 \div 3 \times 8 = 32$$

$$\text{Whence } \frac{69}{12} - \frac{32}{12} = \frac{37}{12} = 3\frac{1}{12}. \quad \text{Ans.}$$

$$(6) \text{ Thus } \frac{3}{4} \text{ of } \frac{7}{5} = \frac{21}{20} \text{ and } \frac{1}{4} \text{ of } \frac{3}{5} = \frac{3}{20}. \\ \text{And } 4) 48 \quad 20$$

$$12 \quad 5 = 240 \text{ common denom.}$$

$$\text{And } 240 \div 48 \times 14 = 70 \quad \text{numer.}$$

$$240 \div 20 \times 3 = 36 \quad \text{numer.}$$

$$\text{Whence } \frac{70}{240} - \frac{36}{240} = \frac{34}{240} = \frac{17}{120}. \quad \text{Ans.}$$

DIVISION OF VULGAR FRACTIONS.

EXAMPLES.

(2) $\frac{5}{6}$ by $\frac{3}{4}$ thus $\frac{1}{3} \times \frac{5}{6} = \frac{5}{18}$. Ans.

(3) $6\frac{2}{3} = \frac{20}{3} \div \frac{1}{2}$ thus $\frac{2}{3} \times \frac{20}{3} = 19\frac{1}{3}$. Ans.

(4) Thus $\frac{3}{4}$ of $\frac{2}{3} = \frac{6}{12}$ and $\frac{1}{2}$ of $\frac{2}{3} = \frac{2}{6}$.
Then $\frac{6}{12} \div \frac{2}{6}$ thus $\frac{1}{2} \times \frac{6}{12} = 1\frac{1}{2}$. Ans.

(5) $\frac{1}{8}$ by $\frac{3}{4}$ thus $\frac{1}{8} \times \frac{4}{3} = \frac{2}{6}$. Ans.

(6) $\frac{3}{4}$ of $\frac{4}{5} = \frac{12}{20}$ and $\frac{1}{2}$ of $\frac{4}{5} = \frac{2}{10}$.
Then $\frac{12}{20} \div \frac{2}{10}$ thus $\frac{1}{2} \times \frac{12}{20} = 16\frac{1}{2}$. Ans.

(7) $\frac{1}{2}$ of $17\frac{1}{4} = \frac{1}{2}$ of $\frac{69}{4} = \frac{35}{4}$.
Then $\frac{35}{4} \div \frac{1}{2}$ thus $\frac{1}{2} \times \frac{35}{4} = 11\frac{1}{2}$. Ans.

(8) Thus $\frac{3}{4}$ of $91\frac{7}{8} = \frac{3}{4}$ of $\frac{735}{8} = \frac{210}{8}$.
And $\frac{210}{8} \div \frac{1036}{80}$ thus $\frac{50}{80} \times \frac{210}{1036} = \frac{1335750}{801600} = 3\frac{64923}{200000}$.
Ans.

RULE OF THREE IN VULGAR FRACTIONS.

EXAMPLES.

(2) Thus $3\frac{1}{4} \text{yds.} = \frac{13}{4}$ and $9\frac{3}{4} \text{s.} = \frac{39}{4}$ and $4\frac{3}{4} \text{yds.} = \frac{19}{4}$.
Then we have $\frac{13}{4} : \frac{39}{4} :: 1\frac{9}{4} : 14\text{s. } 3\text{d.}$
For $\frac{39}{4} \times \frac{19}{4} = \frac{761}{16} \text{s.} - \frac{4}{16} = \frac{757}{16} = 14\text{s. } 3\text{d.}$ Ans.

(3) Thus $\frac{2}{3} : \frac{20}{3} :: \frac{2}{3} : 12\text{yds.}$
For $\frac{20}{3} \times \frac{2}{3} = \frac{40}{9} \text{yd.} = 12\text{yds.}$ Ans.

(4) Thus $27\frac{1}{4} \times 4\text{pe.} = 111\text{yds.}$ and $15\frac{3}{4} \text{s.} = 15\text{s. } 8\text{d.}$
Then say as in whole numbers, $1\text{yd.} : 111\text{yds.} :: 15\text{s. } 8\text{d.} : \text{£}86\text{ } 19\text{s.}$
For $15\text{s. } 8\text{d.} = 188\text{d.} \times 111\text{yds.} = 20868\text{d.}$ which $\div 12$
 $\div 20 = \text{£}86\text{ } 19\text{s.}$ Ans.

(5) Thus $5\frac{3}{4}\text{cwt.} = \frac{23}{4}$ and $\text{£}31\frac{11}{12} = \frac{1006}{12}$.
Then we have $\frac{23}{4} : \frac{23}{4} :: \frac{1006}{12} : \text{£}2\text{ } 6\text{s. } 3\frac{1}{2}\text{d.}$
For $\frac{1006}{12} \times \frac{2}{3} = \frac{2012}{36} = \frac{7}{36} = \frac{7}{6084} \text{£.} = \text{£}2\text{ } 6\text{s. } 3\frac{1}{2}\text{d.}$ Ans.

- (6) First $1\frac{2}{3}lb. = \frac{5}{3}$.
 Then $\frac{1}{3}lb. :: \frac{5}{3} :: 4 \text{ dol.} :: \$2 74\frac{2}{3}\text{cts.}$
 For $\frac{5}{3} \times \frac{4}{1} = \frac{20}{3} \div \frac{3}{1} = \frac{20}{3} \text{ dol.} = \$2 74\frac{2}{3}\text{cts. Ans.}$
- (7) Thus $20\frac{2}{3}d. = \frac{62}{3}$.
 Then inversely thus $6m. : 10m. :: \frac{6}{10} \text{ day.} : 34\frac{1}{3}\text{days.}$
 For $\frac{6}{10} \times \frac{1}{1} = \frac{6}{10} \div \frac{1}{1} = \frac{6}{10} = 34\frac{1}{3}\text{days. Ans.}$
- (8) First $\frac{1}{2}$ of $2\frac{1}{2}\text{cwt.} = \frac{1}{2}$ of $\frac{5}{2} = \frac{5}{4}$ of a cwt.
 Then this reduced to lbs. would be $\frac{5}{4}$ of $1\frac{1}{2} = \frac{5}{2}\text{lb.}$
 Then we have $6\frac{1}{2}\text{lbs.} = \frac{13}{2} : \frac{5}{6} :: \frac{1}{4} : \$10 76\frac{1}{3}\text{cts.}$
 For $\frac{5}{6} \times \frac{1}{4} = \frac{5}{24} = \frac{2}{13} = \frac{33\frac{1}{3}}{31\frac{2}{3}} \text{ dol.} = \$10 76\frac{1}{3}\text{cts.}$

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DECIMAL FRACTIONS.

ADDITION OF DECIMALS.

EXAMPLES.

(5)	56.12 .7 1.314 5837.01 .15	—	(6)	361.04 .120 78.0006 101.54 8.943 .3	—
	Ans. 5895.294	—		Ans. 549.9436	—

MULTIPLICATION OF DECIMALS.

EXAMPLES.

(2)	54.20 38.63 — 16260 32520 43360 16260	—	(3)	4560. .3720 — 91200 31920 13680	—
	Ans. 2093.7460	—		Ans. 1696.3200	—

DECIMAL FRACTIONS.

$$(4) \quad \begin{array}{r} .28043 \\ - .0005 \\ \hline \end{array}$$

$$\text{Ans. } \underline{.000140215}$$

SUBTRACTION OF DECIMALS.

EXAMPLES.

$$(5) \quad \begin{array}{r} 13.16421 \\ - 4.286 \\ \hline \end{array}$$

$$\text{Ans. } \underline{8.87821}$$

$$(6) \quad \begin{array}{r} 5960. \\ - 3742 \\ \hline \end{array}$$

$$\text{Ans. } \underline{5959.6258}$$

DIVISION OF DECIMALS.

EXAMPLES.

$$(2) \quad 4.21)148.63(35.304 + \text{ Ans.}$$

$$\underline{1263}$$

$$\begin{array}{r} 2233 \\ 2105 \\ \hline \end{array}$$

$$\begin{array}{r} 1280 \\ 1263 \\ \hline \end{array}$$

$$(4) \quad 931)2.00385(.0021523 + \text{ Ans.}$$

$$\underline{1862}$$

$$\underline{1263}$$

$$\begin{array}{r} 1700 \\ 1684 \\ \hline \end{array}$$

$$\begin{array}{r} 1418 \\ 931 \\ \hline \end{array}$$

$$\begin{array}{r} 1684 \\ 1263 \\ \hline \end{array}$$

$$\begin{array}{r} 4875 \\ 4655 \\ \hline \end{array}$$

16 rem.

$$\begin{array}{r} 4655 \\ 4655 \\ \hline \end{array}$$

$$(3) \quad 3.2).2142(.066 + \text{ Ans.}$$

$$\underline{192}$$

$$\begin{array}{r} 222 \\ 192 \\ \hline \end{array}$$

$$\begin{array}{r} 30 \text{ rem.} \\ \hline \end{array}$$

$$\begin{array}{r} 2200 \\ 1862 \\ \hline \end{array}$$

$$\begin{array}{r} 3380 \\ 2793 \\ \hline \end{array}$$

$$\begin{array}{r} 587 \text{ rem.} \\ \hline \end{array}$$

REDUCTION OF DECIMALS.

CASE 1.

$$(2) \quad 8)7.000 \quad \begin{array}{r} \\ \hline .875 \end{array} \text{ Ans.}$$

$$(3) \quad 24)170(.70833+ \quad \begin{array}{r} 168 \\ \hline 200 \\ 192 \\ \hline 80 \\ 72 \\ \hline 80 \\ 72 \\ \hline 8 \end{array} \text{ rem.}$$

$$4) \quad 2462.)3810(.1762+ \text{ Ans.} \quad (5) \quad 254)1160(.4566+ \text{ Ans.} \quad \begin{array}{r} 2162 \\ \hline 16480 \\ 15134 \\ \hline 13460 \\ 12972 \\ \hline 4880 \\ 4324 \\ \hline 556 \end{array} \text{ rem.} \quad \begin{array}{r} 1016 \\ \hline 1440 \\ 1270 \\ \hline 1700 \\ 1524 \\ \hline 1760 \\ 1524 \\ \hline 236 \end{array} \text{ rem.}$$

CASE 2

(2) Thus $2R. 4P.=84P.$ $1A.=160P.$
 Then $160)840(.525$ Ans.
 $\underline{800}$

$$\begin{array}{r} 400 \\ 320 \\ \hline 800 \\ 800 \\ \hline \end{array}$$

(3) $2qr. 2na.=10na.$ And $1yd.=16na.$
 Then $16)100(.625.$ Ans.
 $\underline{96}$

$$\begin{array}{r} 40 \\ 32 \\ \hline 80 \\ 80 \\ \hline \end{array}$$

(4) $1hr.=60min.$ And $60)5.00(.08333+$ Ans.
 $\underline{480}$

(5) $1oz.=480grs.$
 Then $480)1000(.02083+$ Ans.
 $\underline{960}$

$$\begin{array}{r} 4000 & 200 \\ 3840 & 180 \\ \hline 1600 & 200 \\ 1440 & 180 \\ \hline 160 \text{ rem.} & 20 \text{ rem.} \\ \hline \end{array}$$

(6) 2 qts. 1 pt. = 5 pts.
 $1 \text{ hhd.} = 504 \text{ pts.}$ Then $504)5000(.00992+$ Ans.

4536

464045361040100832 rem.

CASE 3.

(2)	<u>£</u> .1361 20	Day. <u>.235</u> 24	Gal. <u>.42</u> 4
s. 2.7220		940	qt. 1.68
12		470	2
d. 8.6640	hrs. 5.640	pt. 1.36	Ans. 1 1.36
4	s. d. 60	—	—
Ans. 2 8 $\frac{1}{3}$	—	—	—
qr. 2.6580	min. 38.400	hrs. min. sec.	
	60	sec. 24.000	Ans. 5 38 24

(5)	<u>s.</u> .253 12	<u>Yd.</u> .436 4	<u>Acre.</u> .9 4
d. 3.036	<u>d.</u> —	—	—
Ans. 3.036	qr. 1.744	r. 3.6	40
	4	—	—
na. 2.976	<u>qr. na.</u> —	<u>R. P.</u>	
Ans. 1 2	p. 24.0	Ans. 3 24	—

RULE OF THREE IN DECIMALS.

EXAMPLES

- (2) Thus $1\frac{4}{7}\text{yd.} : 15\text{yd.} :: 13\text{s.} : £6\ 19\text{s. } 3\text{d. } 1\frac{7}{10}\text{qr.}$
 For $13 \times 15 = 195$, the dividend.
 Then $195 \div 1\frac{4}{7} = £6\ 19\text{s. } 3\frac{1}{4}\text{d. } 7\frac{1}{10}\text{qr.}$

(3) Thus $1\text{qr.} : 1\text{yd.} :: \$2\ 34\text{-cts.} : \$9\ 38\text{-cts.}$
 For $2.345 \times 4 = \$9\ 38\text{-cts.}$ Ans.

(4) First sold it for \$106.30cts.
 but paid for it 84.39.12—

gained on it \$23.90.88

Then 10.5cwt. : 1cwt. :: \$23 90cts. 88m. : \$2 27cts.
7m. +

$$\text{For } 23.90 \text{ ss} \div 10.5 = \$2.27 \text{ cts. } 7m. \text{ Ans.}$$

- (5) Thus \$20.8 : \$12.6 :: 240 pie. : 145.38 pie. +
 For $240 \times 12.6 = 3024.0$ which $\div 20.8 = 145.38$ pie. +
 Ans.

(6) Thus 3.5 oz. : 5.2 oz. :: 74.6 cts. : \$1 10 cts. 8 m.
 For $5.2 \times 74.6 \div 3.5 = \$1 10 cts. 8 m.$



POSITION.

SINGLE-POSITION

EXAMELER

- (2) Suppose \$162 in the box.

$\frac{1}{4}$	$\frac{1}{4}$
$\frac{1}{8}$	$\frac{1}{8}$
$\frac{1}{3}$	$\frac{1}{3}$
$\frac{1}{12}$	$\frac{1}{12}$
$\frac{1}{2}$	$\frac{1}{2}$

Result 93.15

Then \$93 15cts. : \$162 :: \$690 : \$1200. Ans.

(3) Suppose C.'s 40

$$\begin{array}{r} +8 \\ \hline \end{array}$$

$$\begin{array}{r} 48=B.\text{'s} \\ +16 \\ \hline \end{array}$$

$$\begin{array}{r} 64=A.\text{'s} \\ 48=B.\text{'s} \\ 40=C.\text{'s} \\ \hline \end{array}$$

152 result.

Then 152 yrs. : $\left\{ \begin{array}{l} 64 :: 133 : 56=A.\text{'s} \\ 48 :: 133 : 42=B.\text{'s} \\ 40 :: 133 : 35=C.\text{'s} \end{array} \right\}$ Ans.

133 proof.

(4) Suppose No. 3 cost 20

$$\begin{array}{r} 3 \\ \hline \end{array}$$

$$\begin{array}{r} 60=\text{No. 2.} \\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 120=\text{No. 1.} \\ 60 \\ 20 \\ \hline \end{array}$$

Result 200

Then 200 : $\left\{ \begin{array}{l} 120 :: 950 : \$210=\text{No. 1.} \\ 60 :: 350 : 105=\text{No. 2.} \\ 20 :: 350 : 35=\text{No. 3.} \end{array} \right\}$ Ans.

$$\begin{array}{r}
 \text{(5) Suppose } \begin{array}{r} \text{Yrs.} \\ 60 \\ - \\ 2 \end{array} \\
 \hline
 \begin{array}{r} 120 \\ - \\ 3 \end{array} \\
 \hline
 \begin{array}{r} 5)360 \\ - \\ 3)72 \\ - \\ 24 \text{ result.} \end{array}
 \end{array}$$

Then 24 yrs. : 60 yrs. :: 14 yrs. : 35 yrs. Ans.

$$\begin{array}{r}
 \text{(6) Thus suppose } \begin{array}{r} \text{£} \\ 40 \\ - \\ 5\frac{1}{4} \end{array} \\
 \hline
 \begin{array}{r} 200 \\ - \\ 20 \\ - \\ 10 \end{array} \\
 \hline
 \text{Int. for 1 yr. } \left\{ \begin{array}{r} \text{£}2|30 \\ 20 \\ - \\ .6|00 \end{array} \right. \\
 \hline
 \begin{array}{r} \text{And } \begin{array}{r} \text{£} \\ 1|2 \\ - \\ 4 \end{array} \text{ s.} \\ \hline 6 \\ \hline 4 \text{ years.} \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{Int. in 4 yrs. } \begin{array}{r} 9 \\ 4 \end{array} \\
 \text{Int. for 8 mo. } \left\{ \begin{array}{r} \text{£}1|3 \\ 0 \\ - \\ 7 \\ \hline 8 \end{array} \right. \\
 \hline
 \text{Whole int. } \begin{array}{r} 10 \\ 14 \\ 8 \end{array}
 \end{array}$$

Then as £10 14s. 8d. : £201 5s. :: £40 : £750. Ans.

- (7) Thus, suppose the cistern to hold 100 gallons.
 Then $100 \div 45\text{min.} = 2\frac{2}{9}\text{gal.}$ = the quantity which the first cock discharges in a minute.
 And $100 \div 55\text{min.} = 1\frac{9}{11}\text{gal.}$ the quantity which the second cock discharges in 1 min.
 Then $100 \div 30\text{min.} = 3\frac{1}{3}\text{gal.}$ = the quantity which the discharging cock discharges in 1 min. Consequently, $2\frac{2}{9}\text{gal.} + 1\frac{9}{11}\text{gal.} = 4\frac{4}{99}\text{gal.}$ the quantity which the cistern receives by both the first and second cocks in a minute. Then as $3\frac{1}{3}\text{gals.}$ run out in the same time, $4\frac{4}{99}\text{gal.} - 3\frac{1}{3}\text{gal.} = \frac{1}{99}\text{gal.}$ that the cistern gains in 1 min.
 Then $\frac{1}{99}\text{gal.} : 100\text{gal.} :: 1\text{min.} : 2\text{hrs. } 21\text{min. } 25\frac{5}{9}\text{sec.}$
 Ans.

DOUBLE POSITION.

- (2) First suppose they received $\frac{276}{2}$
- $$\begin{array}{r} 3) 552 \\ 184 = \text{what A. spent.} \\ + 250 \\ \hline 434 = \text{what B. spent.} \\ - 276 \\ \hline 158 \text{ B. was in debt every} \\ \quad 7 \text{ year.} \\ \hline 1106 = 7 \text{ years' debt.} \\ - 350 \\ \hline 756 \text{ error too much.} \end{array}$$

Again suppose the salary was 300

$$\begin{array}{r} \$ \\ 2 \\ \hline \end{array}$$

$\overline{3)600}$

$200 = A. \text{ spent.}$

$\overline{+250}$

$450 = B. \text{ spent.}$

$\overline{-300}$

B. was every year 150 in debt.

$\overline{7}$

And in 7 years he was 1050 in debt.

$\overline{-350}$

$700 = \text{error too much.}$

Then $756 \times 300 = 226800$

$700 \times 276 = 193200$

Difference of errors 56)33600(\$600 the salary, $\frac{2}{3}$
 $\overline{336}$ of which=400
 $\overline{\quad\quad\quad}$ A. spends, then
 $\overline{00}$ $400 + 250 = 650$
 $\overline{\quad\quad\quad}$ B. spends. Ans.

(3) First suppose 30 working days.

$\overline{1}$

$\overline{\$30}$

$\overline{-10}$ that he forfeits.

Receives $\overline{20}$
 $\overline{27\ 50}$

$\overline{7\ 50}$ error too little.

Again suppose 20 working days.

	1
	<hr/>
	\$20
Forfeits	15
	<hr/>
Receives	5
	27 50
	<hr/>
	22 50 error too little.

$$\begin{array}{r} \text{Then } 2250 \times 30 = 67500 \\ 750 \times 20 = 15000 \end{array}$$

Difference of errors 1500)52500(35 working days.

	4500
	<hr/>
	7500

7500

Therefore 50—35=15 idle days. Ans.

	\$
(4)	First suppose 10 cows=160
	And 10 oxen=240
	40 calves=240
	<hr/>
	The whole 640
	—320
	<hr/>
	320 error too much.

Again suppose 8 cows=128
And 8 oxen=192
And 32 calves=192

	\$
	512
	320
	<hr/>
	192 error too much.
	<hr/>

$$\begin{array}{r} \text{Then } 320 \times 8 = 2560 \\ 192 \times 10 = 1920 \end{array}$$

Difference of errors 128)640(5cows 5oxen & 20calves.
 $\underline{640}$
 Ans.

(5) First suppose

$$\begin{array}{r} \text{Ft.} \\ \hline \text{No. } 2=20 \end{array}$$

$$\begin{array}{r} 10=\frac{1}{2} \\ 15 \end{array}$$

$$\begin{array}{r} 25=\text{No. } 3. \\ +15 \end{array}$$

$$\begin{array}{r} 40 \\ -20 \end{array}$$

20 error too little.

Again suppose

$$\begin{array}{r} \text{Ft.} \\ \hline \text{No. } 2=30 \end{array}$$

$$\begin{array}{r} 15=\frac{1}{2} \\ 15 \end{array}$$

$$\begin{array}{r} 30=\text{No. } 3. \\ +15 \end{array}$$

$$\begin{array}{r} 45=\text{No. } 2. \\ -30 \end{array}$$

15 error too little.

$$\begin{array}{r} \text{Then } 20 \times 30 = 600 \\ 15 \times 20 = 300 \end{array}$$

Difference of errors 5)300

$$\begin{array}{r} 60=\text{No. } 2, \text{ then } 60-15=45= \\ \hline \text{No. } 3. \end{array}$$

And then we have No. 1=15, No. 2=60, and No. 3=45, which added together=120 ft. the length of the pole. Ans.

(6) Thus first suppose the whole property to have been worth £
 Again suppose 432

$\frac{198}{-40}$	$\frac{216}{-40}$
$158 = A.'s$ share.	$176 = A.'s$
$\frac{132}{+12}$	$\frac{144}{+12}$
$144 = B.'s$ share.	$156 = B.'s$
-80	-80
$64 = C.'s$ share.	$76 = C.'s$
144	156
158	176
366 sum.	408 sum.
396	432
30 error of defect.	24 error of defect.

$$\text{Then } 432 \times 30 = 12960$$

$$396 \times 24 = 9504$$

Difference of errors 6)3456

£576 Ans.

Then $576 \div 2 - 40 = 248$ A.'s share.
 $204 \div 3 + 12 = 204$ B.'s do.
 $204 - 80 = 124$ C.'s do.

£576 proof.

(7) First suppose each boy received $\frac{3}{2}$

$\frac{3}{2}$

6 = share of each
3 woman.

18 = share of each
— man.

$$\text{And } 19 \times 3 = 57 \\ 11 \times 6 = 66 \\ 7 \times 18 = 126 \\ \hline$$

$$\begin{array}{r} 249 \\ 172 \ 19 \ 4\frac{1}{4} \\ \hline 76 \ 0 \ 7\frac{3}{4} \text{ error of excess.} \end{array}$$

Again suppose each boy received $\frac{1}{2}$

$\frac{1}{2}$

2 share of each woman.

3

6 share of each man.

$$\text{And } 19 \times 1 = 19 \\ 11 \times 2 = 22 \\ 7 \times 6 = 42 \\ \hline$$

$$\begin{array}{r} 83 \\ 172 \ 19 \ 4\frac{1}{4} \\ \hline 89 \ 19 \ 4\frac{1}{4} \text{ error of defect.} \end{array}$$

$$\begin{array}{r}
 \text{£} \quad s. \quad d. \\
 \text{Now } 89 \ 19 \ 4\frac{1}{4} \times 3 = 269 \ 18 \ 0\frac{3}{4} \\
 \qquad\qquad\qquad 76 \ 0 \ 7\frac{1}{4} \times 1 = 76 \ 0 \ 7\frac{1}{4} \\
 \hline
 & 345 \ 18 \ 8\frac{1}{4}
 \end{array}$$

Which $\div 166$ sum of errors = £2 1s. 8d. + = each boy's share, which $\times 2$ = £4 3s. 4 $\frac{1}{4}$ d. + = each woman's share, which $\times 3$ = £12 10s. 0 $\frac{3}{4}$ d. + = each man's share. Ans.

.....

INVOLUTION, OR THE RAISING OF POWERS.

EXAMPLES.

- (2) $14 \times 14 \times 14 = 2744$. Ans.
- (3) $2.8 \times 2.8 \times 2.8 \times 2.8 \times 2.8 = 481.890304$. Ans.
- (4) $.263 \times .263 \times .263 = 0.018191447$. Ans.
- (5) $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{32}$. Ans.
- (6) $401 \times 401 \times 401 \times 401 = 25656961601$. Ans.

.....

EVOLUTION, OR THE EXTRACTING OF ROOTS.

SQUARE ROOT.

EXAMPLES.

- (2) $\sqrt{39375655} = 6275$ Ans.
- (3) $\sqrt{1486.179010} = 38.55$. Ans.

9

$$\begin{array}{r}
 \overline{122)} \overline{337} \\
 \qquad\qquad\qquad 244
 \end{array}$$

$$\begin{array}{r}
 \overline{68)} \overline{586} \\
 \qquad\qquad\qquad 544
 \end{array}$$

$$\begin{array}{r}
 \overline{1247)} \overline{9356} \\
 \qquad\qquad\qquad 8729
 \end{array}$$

$$\begin{array}{r}
 \overline{765)} \overline{4217} \\
 \qquad\qquad\qquad 3825
 \end{array}$$

$$\begin{array}{r}
 \overline{12545)} \overline{62755} \\
 \qquad\qquad\qquad 62725
 \end{array}$$

$$\begin{array}{r}
 \overline{7705)} \overline{39290} \\
 \qquad\qquad\qquad 38525
 \end{array}$$

Rem. 30

Rem. 76510

$$(4) \sqrt{98385163} = 9817 \text{ Ans.}$$

81

188) 1538

1504

1961) 3451

1961

19627) 149063

137389

Rem. 11674

21) 32

21

225) 1149

1125

2301) 2460

2301

Rem. 159

$$(6) \sqrt{18.362147} = 4.285 \text{ Ans.}$$

16

82) 236

164

848) 7221

6784

8565) 43747

42825

Rem. 922

$$(7) \frac{445}{416} = \frac{49}{4} \text{ whose square root is } \frac{7}{2}. \text{ Ans.}$$

$$(8) \sqrt{36\frac{199}{1764}} = \frac{36}{42} \text{ whose square root is } \frac{6}{7}. \text{ Ans.}$$

$$(9) \quad 500)3200(\sqrt{64}.8 \text{ Ans.} \quad (10) \quad 50 \times 64 + 49 = 3249.$$

3000 64

—

2000

—

2000

—

$$\text{Then } 3249(\frac{4}{5}=7\frac{1}{5} \text{ Ans.}$$

25

—

107).749

749

—

And $\sqrt{64}.8$ denominator.

64

—

$$(11) \quad 30 \times 100 + 25 = 30.25$$

$$(12) \quad 1296(36 \text{ Ans.})$$

$$\text{Then } 30.25(5.5=5\frac{1}{10} \text{ Ans.})$$

25

—

105)525

525

—

$$3 \times 3 = 9$$

66)396

396

—

$$(13) \quad 169(13 \text{ Ans.})$$

1.

—

23)69

69

—

$$(14) \quad 3097600(1760 \text{ yds.} = 1 \text{ mile. Ans.})$$

1.

—

27)209

189

—

346)2076

2076

—

00

—

$$(15) \quad \begin{array}{l} \text{Thus } 15 \times 15 = 225 \\ 24 \times 24 = 576 \end{array}$$

$$\sqrt{801} (28.3 \text{ ft. Ans.})$$

$$\overline{4} \\ 48)401 \\ \underline{384}$$

$$\overline{563)1700} \\ 1689$$

Rem. 11

$$(16) \quad \begin{array}{l} 212 \times 212 = 44944 \text{ ft.} \\ \text{And } 20 \text{ yds.} = 60 \times 60 = 3600 \text{ ft.} \end{array}$$

$$\begin{array}{l} 41344(203.332 \text{ ft. Ans.}) \\ 2 \times 2 = 4 \end{array}$$

$$\overline{403)1344} \\ 1209$$

$$\overline{4063)13500} \\ 12189$$

$$\overline{40663)131100} \\ 121989$$

$$\overline{406662)911100} \\ 813324$$

Rem. 97778

CUBE ROOT.

EXAMPLES.

(2)

$$\begin{array}{r} 7532641(196.02 \text{ Ans.}) \\ 1 \end{array}$$

$$\left\{ \begin{array}{l} \text{Defec. div. and squ. of } 9=381 \quad 6532 \\ +270=\text{com. divisor} \quad =651 \quad 5859 \end{array} \right\}$$

$$\left\{ \begin{array}{l} \text{Def. div. and squ. of } 6=108336 \quad 673641 \\ +3420=\text{com. div.} \quad =111756 \quad 670536 \end{array} \right\}$$

$$\text{Defective divisor } 115248 \quad \underline{\hspace{2cm}} \quad 3105000.$$

$$\left\{ \begin{array}{l} \text{Def. di. \& sq. of .02}=1152480004 \quad 3105000000 \\ +11760=\text{com. div.}=1152491764 \quad 2304983528 \end{array} \right\}$$

$$\text{Rem. } 800016472$$

(3)

$$12.113847500(2.296 \text{ Ans.})$$

$$2 \times 2 \times 2=8$$

$$\left\{ \begin{array}{l} \text{Def. div. and squ. of } 2=1204 \quad 4113 \\ +120=\text{com. divisor} \quad =1324 \quad 2648 \end{array} \right\}$$

$$\left\{ \begin{array}{l} \text{Def. div. \& sq. of } 9=145281 \quad 1465847 \\ +5940=\text{com. di.} \quad =151221 \quad 1360989 \end{array} \right\}$$

$$\left\{ \begin{array}{l} \text{Def. di. \& sq. of } 6=15732396 \quad 104858500 \\ +61830=\text{co. di.} \quad =15773556 \quad 94641336 \end{array} \right\}$$

$$\text{Rem. } 10217164$$

(4)

5382674(175.2 Ans.
1

$$\left\{ \begin{array}{l} \text{Defec. div. and square of } 7=349)4382 \\ +210=\text{complete divisor } =559)8913 \end{array} \right.$$

$$\left\{ \begin{array}{l} \text{Defec. div. & square of } 5=86725)469674 \\ +2550=\text{complete divisor } =89275)446375 \end{array} \right.$$

$$\left\{ \begin{array}{l} \text{Defec. div. and squ. of } 2=9187504)23299000 \\ +10500=\text{com. divisor } =9198004)18396008 \end{array} \right.$$

Rem. 4902992

(5)

378621350(.723. Ans.
7×7×7=343

$$\left\{ \begin{array}{l} \text{Defec. div. & sq. of } 2=14704)35621 \\ +420=\text{com. divisor } =15124)30248 \end{array} \right.$$

$$\left\{ \begin{array}{l} \text{Def. div. & squ. of } 3=1555209)5373350 \\ +6480=\text{com. divi. } =1561689)4685067 \end{array} \right.$$

Rem. 688283

(6)

46.295363543(3.590 Ans.
3×3×3=27

$$\left\{ \begin{array}{l} \text{Def. div. & sq. of } 5=2725)19295 \\ +450=\text{com. divi. } =3175)15875 \end{array} \right.$$

$$\left\{ \begin{array}{l} \text{Def. div. & sq. of } 9=367581)3420363 \\ +9450=\text{com. di. } =377031)3398279 \end{array} \right.$$

Defective divisor 386643)27084543

(7) Thus $4\frac{20}{125} = \frac{52}{25}$, which reduced to a decimal=
 $\underline{2007722}$

Then $.200772200$ Ans.
 $\underline{125}$

$$\left\{ \begin{array}{l} \text{Defec. divisor \& squ. of 8=7564)} \\ \text{+200=complete divisor=8764)} \end{array} \right. \underline{70112}$$

$$\left\{ \begin{array}{l} \text{Defec. div. and sq. of 5=1009225)} \\ \text{+8700=comp. divisor=1017925)} \end{array} \right. \underline{5089625}$$

$\underline{570575}$ Rem.

(8) Thus $\sqrt[3]{36.87} = \sqrt[3]{36.866666} + (3.32)$ Ans.
 $3 \times 3 \times 3 = 27$

$$\left\{ \begin{array}{l} \text{Defec. div. \& squ. of 3=2709)} \\ \text{+270=complete divi. =2979)} \end{array} \right. \underline{8987}$$

$$\left\{ \begin{array}{l} \text{Defec. div. \& squ. of 2=326704)} \\ \text{+198=com. divisor =328684)} \end{array} \right. \underline{657308}$$

$\underline{\text{Rem. } 272208}$

•••••

ALLIGATION.

CASE 1.

(2) $cwt. \quad \$ cts. \quad \$ cts.$

$2 \text{ at } 25 = 50 \text{ 00}$

$4 \quad 20 \text{ 50} = 82 \text{ 00}$

$7 \quad 18 \text{ 62} \frac{1}{2} = 130 \text{ 37} \frac{1}{2}$

$\underline{13} \quad \underline{\$262 \text{ 37} \frac{1}{2}}$

Then as $13 \text{ cwt. : } 1 \text{ cwt. :: } \$262 \text{ 37} \frac{1}{2} \text{ cts. : } \$20 \text{ 18} \frac{1}{2} \text{ cts. }$ Ans.

CASE 2.

$$(2) \text{ Mean rate } 50 \left\{ \begin{array}{l} \text{cts.} \\ 34 = 36 \text{ at } 34 \text{ cts.} \\ 42 = 60 \text{ at } 42 \text{ cts.} \\ 86 = 16 \text{ at. } 86 \text{ cts.} \\ 110 = 8 \text{ at } 110 \text{ cts.} \end{array} \right\} \text{Ans.}$$

CASE 3.

$$(2) \text{ Mean rate } 92 \left\{ \begin{array}{l} \text{cts.} \\ 75 = 2 \\ 86 = 13 \\ 94 = 17 \\ 105 = 6 \\ \text{lbs.} \\ \text{Then } 2 : 6 :: 13 : 39 \text{ at } 86 \text{ cts.} \\ 2 : 6 :: 17 : 51 \text{ at } 94 \text{ cts.} \\ 2 : 6 :: 6 : 18 \text{ at } 105 \text{ cts.} \end{array} \right\} \text{Ans.}$$

CASE 4.

$$(2) \text{ Mean rate } 145 \left\{ \begin{array}{l} \text{cts.} \\ 130 = 15 + 35 = 50 \\ 160 = 15 \\ 180 = 15 \\ \hline 80 \text{ sum of differ.} \end{array} \right.$$

$$\text{Then as } 80 : 50 :: 32 : 20 \text{ at } 130 \text{ cts.} \\ 80 : 15 :: 32 : 6 \text{ at } 160 \text{ cts.} \\ 80 : 15 :: 32 : 6 \text{ at } 180 \text{ cts.} \left. \right\} \text{Ans.}$$

ARITHMETICAL PROGRESSION.

CASE 1.

EXAMPLES.

(2) Thus $40 - 1 = 39$

2 com. dif.

78

2=1st term.

80

2=1st term.

82 sum.

40

2)3280

\$16.40 Ans.

(3) $10 - 1 = 9$

4 com. dif.

36

+10=1st term.

1st Ans. 46 last term.

+10

56

10

2)560

280 2d Ans.

(4)

75 - 1 = 74

2 common difference.

148

+6=1st term.

\$1.54 for the last. 1st Ans.

6=1st term.

160 sum.

75

800

1120

2)12000

\$6 00 in the whole. Ans.

CASE 2.

$$(2) \quad \begin{array}{r} \text{Thus } 175 \\ -21 \\ \hline 8-1=7154 \\ \hline \$22 \text{ common difference.} \end{array}$$

And $175+21=196$ sum of extremes.
 8 number of terms.

$$\begin{array}{r} 2)1568 \\ \hline 784 \text{ whole sum.} \end{array}$$

$$\begin{array}{l} \text{Lastly } 21+22=43=2\text{d payment.} \\ 43+22=65=3\text{d} \\ 65+22=87=4\text{th} \\ 87+22=109=5\text{th} \\ 109+22=131=6\text{th} \\ 131+22=153=7\text{th} \\ 153+22=175=8\text{th} \end{array}$$

$$\begin{array}{r} 763 \\ 21=\text{1st payment.} \end{array}$$

$\$784$ proof.

$$(3) \quad \begin{array}{r} \text{Thus } 49 \\ -4 \\ \hline 10-1=945 \end{array} \quad \begin{array}{r} \text{Then } 49+4=53 \text{ sum of extremes.} \\ 10 \text{ number of terms.} \\ \hline 2)530 \\ \hline 5 \text{ com. dif. Received } \$2.65 \text{ Ans.} \end{array}$$

GEOMETRICAL PROGRESSION.

EXAMPLES.

(2) Thus power 1 2 3 4
 Ratio 3 9 27 81
 $\frac{27}{3}$ 3d power.

$$\begin{array}{r} 567 \\ 162 \\ \hline 2187 = 7\text{th power.} \\ 5 = 1\text{st term.} \end{array}$$

1st Ans. $\frac{10935}{3}$ = last term.
 $\frac{3}{3}$ ratio.

$$\begin{array}{r} 32805 \\ -5 = 1\text{st term.} \end{array}$$

Ratio less 1=2)32800

$\frac{\$16400}{\$16400}$ Ans. 2d.

(3) Thus power 1 2 3 4 5 6 7 8 9
 Ratio 2 4 8 16 32 64 128 256 512
 $\frac{512}{512}$

$$\begin{array}{r} 1024 \\ 512 \\ \hline 2560 \\ 262144 = 18\text{th p.} \\ 4 = 2\text{d do.} \end{array}$$

$\frac{1048576}{1048576}$ = 20th p.
 $\frac{1}{1}$ 1st term.

$\frac{1048576}{2}$ = last term.
 $\frac{2}{2}$ ratio.

$\frac{2097152}{1}$
 $\frac{1}{1}$ = 1st term.

Ratio less 1=1)2097151

Ans. \$20971.51cts.

COMPOUND INTEREST BY DECIMALS.

EXAMPLES.

(2) Thus, tabular number 1.2155062
 750

607753100
 85065434

911.6296500

Amount of £1 for 6mo. 1.024695 from table first.

45581482500
 82046668500
 54697779000
 36465186000
 18232593000
 9116296500

£984.1423442067500
 20

12

d.10.1626096200000

	<i>£</i>	<i>s.</i>	<i>d.</i>	
Amount	934	2	10+	
Principal	750	0	0	

<u>Interest</u>	<u>184</u>	<u>2</u>	<u>10+</u>	<u>Ans.</u>
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CASE 2.

- (1) Thus £695 13s. 9d.=695.6875£.
Then from tab. II. $1.2762815 \times 695.6875 = 895.68750$ (545£ 1s.
9d.) + Ans.
- (2) Thus £260 5s. 3d.=260.2625£ which \div by 1.191016
from table II.=£218 10s. 5d. + Ans.

---•---

ANNUITIES AT COMPOUND
INTEREST.

CASE 1.

- (2) The number from table III.=5.637093
 $\frac{200}{\text{annuity.}}$

Amount for yearly payments=1127.4186 which \times
1.014781 proper number for $\frac{1}{2}$ yearly payment from
table V.=\\$1144 08 2m. + Ans.

CASE 2.

- (2) Thus, the num. from tab. IV.=4.21296
 $\frac{\text{£70 annuity.}}{\$294.8652}$

$\frac{\$294.8652}{\text{Ans. for yearly payments.}}$

Then $\$294.8652 \times 1.014781$ from table V. =
\\$299.223+mills. Ans. for $\frac{1}{2}$ yearly payments.

And 294.8652×1.022257 for quarterly payments
from the same table=\\$301.428+mills. Ans. for
quarterly payments.

ANNUITIES IN REVERSION.

(2) Thus $9+4=13$ yrs. = 9.98565 table IV.
 4 do. = 3.62969

$$\begin{array}{r}
 6.35576 \\
 120 \\
 \hline
 1271152 \\
 635576 \\
 \hline
 \$762.69.1.2m. Ans.
 \end{array}$$

.....

PERPETUITIES AT COMPOUND
INTEREST.

(2) Thus, ratio— $1=1.06=1=.06$ 260.00

$$\begin{array}{r}
 \$4333.33.3m.+ Ans.
 \end{array}$$

.....

COMBINATION.

EXAMPLES.

(2) Thus $20\times19\times18\times17\times16\times15\times14\times13\times12\times11=$
 $1\times2\times3\times4\times5\times6\times7\times8\times9\times10=$
 67044257200
 \hline
 $=184756$ Ans.
 3628800

PERMUTATION.

EXAMPLES.

- (2) Thus $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 \times 11 \times 12 =$
 479001600 number of changes.
 15 seconds.

$$\begin{array}{r} 2395008000 \\ 479001600 \\ \hline \end{array}$$

$6|0)718502400|0$ sec.

$6|0)11975040|0$ min.

$365\frac{1}{4}$ d. = 8766 hrs. $1995\frac{5}{8}$ (227 yrs. 248 days. 6 hrs.
Ans.

.....

DUODECIMALS.

ADDITION OF DUODECIMALS.

EXAMPLES.

Ft.	in.	"	"	"
10	5	6	11	6
15	9	5	2	10
18	4	1	7	9
12	8	6	5	7

Ans. 57 3 8 3 8

Ft.	in.	"	"	"
37	8	10	6	9
43	11	2	4	7
19	7	5	3	8
18	4	1	7	2

Ans. 119 7 7 10 .2

	<i>Ft. in. "</i>
(3)	16 8 0
	14 6 0
	17 9 2

Ans. 48 11 2

SUBTRACTION OF DUODECIMALS.

EXAMPLES.

	<i>Ft. in. " "</i>	<i>Ft. in. " "</i>
(1) From	38 8 4 7 5	(2) From
Take	15 11 6 9 3	Take
	Ans. 22 8 9 10 2	Ans. 706 6 3 5 8

	<i>Ft. in. " "</i>
(3)	From 475 7 2 0 0
	Take 81 2 5 10 6
	Ans. 394 4 8 1 6

MULTIPLICATION OF DUODECIMALS.

CASE I.

EXAMPLES.

	<i>Ft. in.</i>	<i>Ft. in. "</i>
(2)	54 10	(3) 6 9 3
	5 7	3 5
	31 11 10	2 9 10 3
	274 2	20 3 9
	Ans. 306 1 10	Ans. 23 1 7 3

CASE 2.

(2)

		Ft. in. "
6	1	81 10 4
		$7 \times 2 = 14$
		573 0 4
		2
		1146 0 8
1	1	40 11 2
4"	1	6 9 10 4
1	1	2 3 3 5 4
		6 9 10 4
		ft 1196 7 9 7 8 Ans.

(3)

in.		Ft. in. " "
4	1	2 5 7 2
		—
1	1	0 9 10 4 8
3"	1	2 5 7 2
6""	1	7 4 9 6
4"""	1	1 2 9 7
1	1	9 10 4 8
		2 5 7 2

1 1 0 8 5 4 11 10 contents of 1 sh.
 $10 \times 10 \times 10 = 1000$

10	10	7	0	6	1	10	4
						10	
108	9	10	5	1	6	7	4

sq. ft. 1088 2 8 3 3 6 1 4 Ans.

PROMISCUOUS EXAMPLES.

$$(1) \quad \begin{array}{r} \text{Thus A.'s 25 years.} \\ +15 \\ \hline \end{array}$$

$$\begin{array}{r} \text{B.'s 40 years.} \\ +12 \\ \hline \end{array}$$

$$\begin{array}{r} \text{C.'s 52 years. Ans.} \\ \hline \end{array}$$

$$(2) \quad \begin{array}{r} \text{Thus } 220 \ 50 \div 5 = 44 \ 10 \text{ A.'s own share.} \\ 220 \ 50 \div 6 = 36 \ 75 \text{ B.'s do.} \\ \hline \end{array}$$

$$\begin{array}{r} 80 \ 85 \text{ sum.} \\ 220 \ 50 \\ \hline \end{array}$$

$$\begin{array}{r} 139 \ 65 = \text{C.'s own share.} \\ \hline \end{array}$$

$$\begin{array}{r} \text{Then } 36 \ 75 \div 2 = 18 \ 37 \ 5 = \frac{1}{2} \text{ B.'s share.} \\ 44 \ 10 \\ \hline \end{array}$$

$$\begin{array}{r} 62 \ 47 \ 5 = \text{A.'s last share.} \\ \hline \end{array}$$

$$\begin{array}{r} \text{And } 18 \ 37 \ 5 \\ 139 \ 65 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Ans. } 158 \ 02 \ 5 = \text{C.'s last share.} \\ \hline \end{array}$$

- (3) \$100— $7\frac{1}{2}$: \$100 :: \$56 25cts. : \$60 81cts. +
 For $5625 \times 100 = 562500$ the dividend.
 And $100 - 7\frac{1}{2} = 92\frac{1}{2}$ the divisor.
 Then $562500 \div 92\frac{1}{2} = \$60\ 81cts.$ + Ans.
- (4) Thus B. gains 2 miles per hour.
 Then as $2m.$: $50m.$:: $1hr.$: $25hrs.$ 1st Ans.
 Now as B. went at the rate of 10 miles per hour for
 25 hours, $10 \times 25 = 250$ miles, the 2d Ans.

(5) Thus $\frac{4}{5} = \frac{1}{4}750$

187 50 whole price of the damaged.
100 loss.
<hr/>
87 50 what it sold for.
<hr/>

Then \$1 25cts. : \$87 50cts. :: 1yd. : 70yds. = quantity damaged.
 And $70 \times 4 = 280$ yds. the whole quantity.

70

210 undamaged.

And \$750 00cts. cost.
 $87'50$ received for the damaged.

$210yds.$: \$662 50 :: 1 : \$3 15 $\frac{1}{4}$ cts. + Ans.

- (6) To get first brick, 4 ft. first term.
Last brick, 400 ft. last term.

—
404 sum of extremes.

100 number of terms.

2)40400
—

Feet in a mile, 5280)20200(3 m. 4360 ft.

15840
—

4360

- (7) Thus admit the wall to contain 3600 feet.

Then 20)3600(180 feet raised in a day by A. B. & C.

24)3600(150 B. C. & D.

30)3600(120 C. D. & A.

36)3600(100 A. B. & D.

—
3)550
—

$183\frac{1}{3}$ feet per day by altogether.

Then $183\frac{1}{3}$
B. C. & D. 150

—
A. $33\frac{1}{3}$

And $183\frac{1}{3}$
C. D. & A. 120

—
B. $63\frac{1}{3}$

And 183½	And 183½
A. B. & D. 100	A. B. & C. 180
<u>C. 63½</u>	<u>D. 3½</u>

days.

Then, feet per day by A. $3\frac{1}{2} \times 3600(108)$ for A. to do it in.
do. by B. $63\frac{1}{2} \times 3600(56\frac{1}{3})$ B. do.
do. by C. $3\frac{1}{2} \times 3600(43\frac{1}{3})$ C. do.
do. by D. $3\frac{1}{2} \times 3600(1080)$ D. do.
And $183\frac{1}{2} \times 3600(19\frac{1}{3})$ days all working together. Ans.

$$(8) \begin{array}{rcl} & d. & d. \\ \text{Thus 4 crowns at } 146 \text{ each} & = 584 & \\ 3 \text{ dolls.} & 108 & = 324 \\ 2 \text{ ducats} & 136 & = 272 \\ \hline & & 1180d. \text{ sum.} \end{array}$$

And £1055 15s. = 253380d.

$$\text{Then } \left. \begin{array}{l} 584 : 125402 \div 146 = 858\frac{2}{3}cr. \\ 324 : 69572 \div 108 = 644\frac{1}{3}d. \\ 272 : 58406 \div 136 = 429\frac{1}{3}duc. \end{array} \right\} \text{Ans.}$$

$$(9) \text{ Thus } 9m. : 21m. :: \$332 50cts. : \$775 83\frac{1}{3}cts. \text{ Ans.}$$

For $33250 \times 21 = 698250$ the dividend.
And 9=the divisor.
Then $698250 \div 9 = \$775 83\frac{1}{3}cts.$

$$(10) \quad \begin{array}{r} \text{Thus } 12 \\ - 4 \\ \hline \end{array}$$

$$\begin{array}{r} 16 \text{ yrs.} = 10.83777 \text{ Table IV.} \\ \text{Time of reversion } 12 = 8.86325 \text{ do.} \\ \hline \end{array}$$

$$\begin{array}{r} 1.97452 \text{ difference.} \\ 720.25 \text{ annuity.} \\ \hline \end{array}$$

$$\begin{array}{r} 987260 \\ 394904 \\ 394904 \\ 1382164 \\ \hline \$1422.1480200 \end{array}$$

Or \$1422 14cts. 8m. + Ans.

$$(11) \begin{array}{l} 3150 \text{ gigs} \div 7 \times 5 = \} \$ cts. \\ 2250 \text{ wagons wh. } \times 6 cts. = \} 135 00 \text{ for the wagons.} \\ 3150 \text{ gigs} \div 3 \times 5 = \} \\ 5250 \text{ footmen wh. } \times 1 ct. = \} 52 50 \text{ for footmen.} \\ 5250 \text{ footmen} \div 6 \times 4 = \} \\ = 3500 \text{ horsemen } \times 2 cts. = \} 70 00 \text{ for horsemen.} \\ 3150 \text{ gigs at } 4 cts. \text{ per gig} = \} 126 00 \text{ for gigs.} \end{array}$$

Amount of toll 383 50 Ans.

- (12) Thus 15gals. in 3min.=5gals. per min. that run in.
 And $20 \div 5 = 4$ gals. that run out in a min. Consequently, the gain is $5 - 4 = 1$ gal. per min. which is 60gals. per hour.
 Then $110 - 60 = 50$ gals. yet to run in.
 Then 5gals. : 50gals. :: 1min. : 10min. Ans.

(13)

Thus 264
6

$$\begin{array}{r}
 \text{mo.} \\
 \hline
 6\frac{1}{2} | 15 84 \text{ Int. for 1 year.} \\
 \hline
 3\frac{1}{2} | 7 92 \\
 \hline
 & 3 96 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 11 88 \text{ Int. for 9 months.} \\
 264 00 \\
 30 00 \text{ profit.} \\
 \hline
 \end{array}$$

\$305 88 for the whole.

$$\begin{array}{r}
 \text{lbs.} \quad \$ \text{ cts. m.} \\
 \text{Then } 28 \text{cwt.} = 3136) 30588(0 \ 9 \ 7+ \text{ Ans.} \\
 2824 \\
 \hline
 23640 \\
 21952 \\
 \hline
 \text{Rem.} \quad 1688 \\
 \hline
 \end{array}$$

(14) Thus, the proportions are A. 4, B. 5, C. 3=12.

$$\begin{array}{r}
 \text{Then } 12 : 780 :: \left. \begin{array}{l} \{ 4 : 260 \text{ A.'s share of profit} \\ 5 : 325 \text{ B.'s do.} \\ 3 : 195 \text{ C.'s do.} \end{array} \right\} \text{ 1st. Ans.} \\
 \hline
 \end{array}$$

\$780 proof.

$$\begin{array}{r}
 \$ \text{ mo.} \\
 \text{Then } 260 \times 5 = 1300 \\
 325 \times 7 = 2275 \\
 195 \times 9 = 1755 \\
 \hline
 5330
 \end{array}$$

$$\text{Again } 5330 : 5762 :: \begin{cases} 1300 : 1405 \text{ 36 A.'s stock.} \\ 2275 : 2459 \text{ 39 B.'s} \\ 1755 : 1897 \text{ 25 C.'s} \end{cases}$$

\$5762 00 proof.

$$\text{Now } 2459 \text{ 39} \\ 2087 \text{ 00 B. received.}$$

$$372 \text{ 39 B.'s loss of stock.} \\ \text{And } 325 \text{ 00 do. of gain.}$$

Ans. \$697 39 A. & C. would gain.

$$(15) 100 + 5\frac{1}{2} = 105 \text{ 75} \quad \$ \text{ cts. m.} \\ \text{Then } 105 \text{ 75} : 100 :: 1000 : 945 \text{ 62 } 6 \text{ cost C.} \\ 20 \text{ 75 } 0 \text{ less.}$$

\$924 87 6 cost B.

$$\text{Again } 100 \\ -5 \text{ 50}$$

94 50 : 100 :: \$924 87cts. 6m. : \$978 70cts.
4m. that the whole cost A. which $\div 20 \text{ hds.} = \$48$
93cts. 5m. + per hhd. Ans.

$$(16) \quad 10 \times 11 = 110 \text{ sold for.} \\ 1 \times 7 = 70 \text{ worth.}$$

\$40 gain of A.

$$\text{And } 110 \div 3 = \begin{array}{r} \$ \text{ cts. m.} \\ 36 \text{ 66 } 6 + \text{paid cash.} \\ 110 \text{ 00 } 0 \end{array} \quad \begin{array}{r} \$ \text{ cts.} \\ 5 \text{ 25} \\ 4 \text{ 50} \end{array}$$

\$73 33 3 to pay in paper. \$0 75 B. gains.

Then 450 : 75 : : 73 33 3 : \$12 22cts. 2m. gain of B.
And \$40 - \$12.22.2 = \$27 77cts. 8m. more gained by A. Ans.

(17) Thus $21 - 14 = 7$ years to be of age.

Then \$1300

6

7800 int. for first year.

1300

1278 amount—100.

6

7668 int. second year.

1278

125468 amount—100.

6

752808 int. third year.

125468

12299608 amount—100.

6

73797648 int. fourth year.

12299608

12037584 amount—100.

6

72225504 int. fifth year.

12037584

11759839 amount—100.

6

70559034 int. sixth year.

11759839

11465429 amount—100.

6

68792574 int. seventh year.

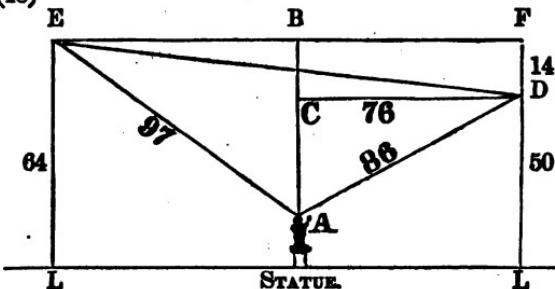
11465429

\$1115.33.54^m. amount—100. Ans.

Another solution :

First, $1.06^7 = 1.5036302$. See table II. Arithmetic.
 And $1.5036302 \times 1300 = 1954.719$ Amount at Compound Interest.
 Also, $8.393637 \times 100 = 839.388$. Amount of \$100 Annuity for 7 years, table III.
 Hence $\$1954.719 - \$839.388 = \$1115\ 33cts.\ 5m.$ Ans.

(18)



Thus, referring to the above figure.

A B is a perpendicular line erected on the centre of the statue's base, which forms the side A C of the right angle A C D; and the other two sides, A D 86 and C D 76, are given to find the length of the side A C.

$$\begin{array}{r} \text{Now } 76^2 = 5776 \quad \& 86^2 = 7396 \\ & -5776 \end{array}$$

$$\sqrt{1620 \text{ diff.}(40.2 +)} = A C$$

Then $40.2 - 14$ the difference between the columns
 $= 54.2$ the whole length of A B. Then $54.2^2 =$
 2987.64 & $97^2 =$
 that is A E = 9409

$$\overline{-2987.64}$$

$$\begin{array}{r} \sqrt{6471.36} = (80.44 + \text{for EB} \\ + 76 \quad \text{that is BF} \end{array}$$

$$14 = DE$$

$$\overline{14}$$

$$\overline{56}$$

$$\overline{14}$$

$$\overline{196}$$

$$156.44 = EB\ F$$

$$\overline{156.44}$$

$$\overline{62576}$$

$$\overline{62576}$$

$$\overline{93864}$$

$$\overline{78220}$$

$$\overline{15644}$$

$$\overline{24473.4736}$$

$$\overline{196}$$

$$\overline{\sqrt{24669.4736} = 157\text{ft. Ans.}}$$

NOTE.—This solution supposes the statue to be lower than the columns: admitting it to be higher, the operation will, of course, be different; but may readily be performed from the one here given.

$$(19) \quad 1\text{sec.} : 47\text{sec.} :: 1150/\text{ft.} : 54050/\text{ft.} \quad \text{Ans.}$$

$$(20) \quad 15m. 7fur. = 83820/\text{ft.}$$

$$\text{Then } 1150/\text{ft.} : 83820/\text{ft.} :: 1\text{sec.} : 1m. 12\frac{1}{2}\text{sec. Ans.}$$

(21) First suppose $\frac{1}{2}$ of 8.2245 in. to be gold.

$4.11225 = \frac{1}{2}$	4.11225 in. of sil.
10.36	5.85
2467350	2056125
1233675	3289800
411225	2056125
42.6029100 oz. g.	24.0566625 oz. sil.
24.0566625	
66.6595725	
63	
66.6595725	error of excess.

Again suppose $\frac{1}{2}$ of 8.2245 in. to be gold, the rest silver.

$2.7415 = \frac{1}{2}$	$5.4830 =$ silver.
10.36	5.85
164490	274150
82245	438640
27415	274150
28.401940 oz.	32.075550 oz. sil.
32.075550	
60.477490	
63.	
60.477490	error of defect.

[See following page.]

Then $3.6595725 \times 2.7415 = 10.03271800875$
 And $2.522510 \times 4.11225 = 10.37319174750$

And $2.522510 + 3.6595725 = 6.1820855$ $\underline{-} 6.1820855$ 20.4059975025 (3.3008148 inches of gold.
 18.5462475

$$\begin{array}{r}
 185966225 \\
 185462475 \\
 \hline
 5087500625 \\
 4945686900 \\
 \hline
 91840250 \\
 61820825 \\
 \hline
 300194250 \\
 247283390 \\
 \hline
 529108500 \\
 494568600 \\
 \hline
 34542900 \text{ rem.}
 \end{array}$$

Then $3.3008148 \times 10.36 = 34.186441328$ ounces of gold, and the rest, which is 28.803559672
 ounces silver. Ans.

Another solution :

$\frac{\text{oz.}}{\text{oz.}} \quad \frac{\text{oz.}}{\text{oz.}}$
First $63 \div 8.2245 = 7.66$ weight of a cubic inch of the mixture.

Then $7.66 \left\{ \begin{array}{l} 10.36 = 1.81 \text{ proportional bulk of gold.} \\ 5.85 = 2.7 \text{ proportional bulk of silver.} \end{array} \right.$

Also $1.81 \times 10.36 = 18.7516$ proportional weight of gold.
And $2.7 \times 5.85 = 15.795$ proportional weight of silver.

34.5466 sum.

Hence $34.5466 : 18.7516 :: 63 : 34.19587$ gold }
And $34.5466 : 15.795 :: 63 : 28.80356$ silver. } Ans.

Proof 62.99943

(22) Thus 7 lbs. beef at $5\frac{3}{4}$ cts. = $40\frac{1}{4}$ cts.

5 bread at 6 = 30

Then $40\frac{1}{4}$ cts. : \$34 50 cts. :: 30 cts. : \$25 71 cts. 4 m. +

Ans.

(23) Thus $\frac{4}{7}$ of $\frac{5}{4}$ of $\frac{362}{43} = \frac{7240}{29160}$.

Then $1 - \frac{7240}{29160} = \frac{219160}{29160}$. Ans.

(24)

$\frac{1000}{6}$

60/00 int. for 1 year.

8

\$480 int. for 8 years.

Then 8 years.
6 per cent.

48
100

148 amt. of \$100 for 8 years. at 6 per cent.

\$ \$ \$ \$ cts. m.
Then 148 : 100 :: 1000 : 675 67 5 the present worth.
1000 00 0

\$324 32 5 discount.
480 00 0 interest.

Ans. \$155 67 5 difference.

$$(25) \quad \begin{array}{r} \sqrt{32}=5.656+ \\ \sqrt{24}=4.9 \end{array}$$

$$\begin{array}{r} 10.556 \text{ sum.} \\ \sqrt[3]{67}=4.06+ \end{array}$$

Ans. 6.496 difference.

(26) Thus \$100 : \$105 $\frac{1}{4}$:: \$2450 : \$2587 50cts. Ans.

(27) Thus the amount of \$500 75cts. for 9 months at 6 per cent. = \$523 28cts. 4m.

cts. \$ cts.
 And $50\frac{1}{2} \times 2\frac{1}{2} = 126$ 60 price of the boards.
 $140 \times 1\frac{1}{2} = 18$ 20 do. tallow.

144 80 amt.
523 28 4

\$378 48 4 to receive in flax-seed.

Then as $92\frac{1}{2}$ cts. : \$378 48 cts. 4m. :: 1bu. : $409\frac{15}{2}$ bu.
 Ans.

(28) 9 yrs.=36 qrs. the sum of terms.

—1

—

35

3 common difference.

—

105

+6=1st term.

—

111 last term.

6=1st term.

—

117 sum.

× 36 number of terms.

—

702

351

—

2)4212

\$21.06 cts. due him. Ans.

- (29) Thus 5 yrs. - 2 $\frac{1}{2}$ yrs. = 2 $\frac{1}{2}$ yrs.
 Then $1.06 \times 1.06 \times 1.045 = 1.174162$ divisor.
 And $2363.3875 \div 1.174162 = \$2012\ 82cts.\ 9m.$ Ans.

- (30) Thus, from January 14th, 1802, till July 5th, 1807,
 inclusive = 5 years 173 days. And the amount of
 \$1854.69 for that time at 5 per cent. per annum =
 \$2362.3161
 285. paid off.

2077.3161 second bond.

$4\frac{3}{4}$

83092644
 10386580
 5193290

98.67.2514 int. of the 2d bond for 1 yr.

Then 98672514 : 365 :: 52.65 : 194 days the time
 of the second bond.

Now 2077.3161
 52.65 interest.

2129.9661 amount.
 102.43 paid off.

2027.5361 3d bond.

Which was out from January 12, 1808, till October 26th, 1813, which is 5.789 years.

\$2497.0323 last amount.
2027.5361 last bond.

469.4962 gained on the last bond, which
was out 5.789 years, and
this bond inclusive to the
time=11737.4064829.

Then 11737.4064829 : 469.4962 :: 100 : 4 per cent.
Ans.

(31) First suppose 10 horses at \$ \$
50=500
20 cows 20=400
60 sheep 4=240

\$1140 sum.
456

684 error of excess.

Again suppose 8 horses at \$ \$
50=400
16 cows 20=320
48 sheep 4=192

\$912 sum.
456

456 error of excess.

$$\begin{array}{r} \text{• Then } 684 \times 8 = 5472 \\ 456 \times 10 = 4560 \end{array}$$

$$\begin{array}{r} \text{Difference of errors} = 228 \\ 912 \\ \hline \end{array}$$

$$\begin{array}{r} \text{For 4 horses at } 50 = 200 \\ 8 \text{ cows } 20 = 160 \\ 24 \text{ sheep } 4 = 96 \\ \hline \end{array} \left. \begin{array}{l} \$ \\ \$ \end{array} \right\} \text{Ans.}$$

\$456 proof.

Another solution :

$$\begin{array}{l} \text{First } 50 \text{ price of each horse.} \\ 20 \times 2 = 40 \text{ price of cows for each horse.} \\ 4 \times 6 = 24 \text{ price of sheep for each horse.} \\ \hline \end{array}$$

$$\begin{array}{r} 114)456(4 \text{ number of horses.} \\ 456 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Then 4 horses at } 50 = 200 \\ 4 \times 2 = 8 \text{ cows } 20 = 160 \\ \text{And } 8 \times 3 = 24 \text{ sheep } 4 = 96 \\ \hline \end{array} \left. \begin{array}{l} \$ \\ \$ \end{array} \right\}$$

456 proof.

PROMISCUOUS EXAMPLES.

$$(32) \text{ Thus } \begin{cases} 16 \\ \text{Mean rate } 19 \\ 17 \\ 24 \end{cases} = \begin{matrix} 5 \\ 5 \\ 5 \\ 3+2=5 \end{matrix}$$

Then as $5 : 10 :: \begin{cases} 5 : 10 \text{ of } 17 \text{ carats fine.} \\ 5 : 10 \text{ of } 24 \text{ carats fine.} \end{cases}$ Ans.

(33) £100 : £120 :: £230 5s. : £276 6s. the amount in sterling.

Then as £1 : £276 6s. :: \$4 44cts. 4m. : \$1227 87cts. 7m. + Ans.

(34) Thus $\frac{17}{10} + \frac{1}{4} = \frac{51}{20}$, and $\frac{51}{20}$ subtracted from 1 = $\frac{19}{20}$
= the 27 feet.

Then $\frac{19}{20} : 27\text{ft.} :: 1 : 113\text{ft. 4in.}$ Ans.

(35) \$7 - 56\frac{1}{4}\text{cts.} = \\$6 43\frac{3}{4}\text{cts. the cost of one yard.}

Then \$6 43\frac{3}{4}\text{cts.} : 56\frac{1}{4}\text{cts.} :: \\$400 : \\$34 95cts. 1m. Ans.

$$(36) \quad \begin{array}{r} \text{Thus } \begin{array}{r} 80 \\ +96 \\ \hline \end{array} \\ \quad \begin{array}{r} 126 \text{ sum.} \\ 252 \text{ number of terms.} \\ \hline \end{array} \\ \quad \begin{array}{r} 630 \\ 252 \\ \hline 23150 \\ \hline \$15.75 \text{ Ans.} \end{array} \end{array}$$

(37) Thus $4 : 9 :: 47 : 105.75$ the greater number.

47

152.75 sum.
58.75 difference.

76375
106925
122200
76375

Product 8974.0625 Ans.

THE END.



